



GREEN ECONOMY AND CLIMATE MITIGATION

Topics of Relevance to Africa

Edited by
Godwell Nhamo



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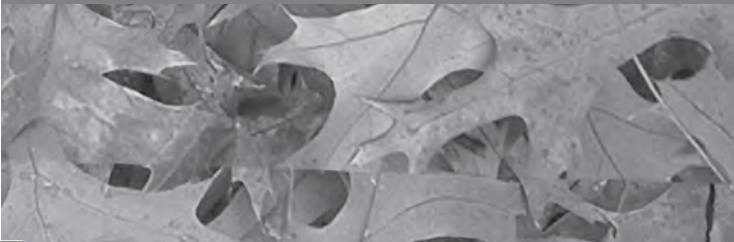
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Green Economy and Climate Mitigation: Topics of Relevance to Africa

First Published in 2011 by the
Africa Institute of South Africa
PO Box 630
Pretoria 0001
South Africa

ISBN: 978-0-7983-0293-7

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Foreword

In recent years, with the increasing focus on issues of sustainability, climate change and the environment, the colour green has taken on new meanings. How often have we read, heard or spoken about green buildings, green financing, green jobs, greenwashing, green accounting, green schools, green agriculture, green tourism, green politics, green procurement, green business and green cars? Since the global financial meltdown of 2008, the world has moved swiftly in embracing yet another term linked to 'green', namely the green economy. Although a universally accepted definition of this concept has not yet emerged, there is a rapidly growing understanding of the green economy and how it is inextricably linked to issues relating to global sustainable development and, concomitantly, poverty eradication.

This book marks the hosting of the 17th Session of the Conference of Parties (COP17) by the United Nations Framework Convention on Climate Change, which will take place in Durban, South Africa, in November and December 2011. The importance of the subject is also highlighted in that the green economy has been identified as one of the twin themes of the United Nations Conference on Sustainable Development scheduled to take place in Rio de Janeiro, Brazil, in 2012 – the 'Rio+20'.

The present study is essentially an interdisciplinary reflection and record of the pertinent issues, and it sees the light of day at a most opportune moment, given the promising synergies of key global development agendas and policy frameworks. In the main, it covers the following areas: discourses on sustainable development; discussions of the Millennium Development Goals; advocacy for good governance; key global environment concerns, such as climate change, energy provision, food security, loss of biodiversity and water scarcity; and the reality of the economic crises. These are issues to which no individual or government can be immune.

At the heart of the discourse on the green economy is the subject of climate change and the need for a transition to low-carbon-driven

economies. The climate change dialogue seeks to address five thematic areas, namely *mitigation* (the reduction of greenhouse gases that cause global warming leading to climate change); *adaptation* (living with the changing climate); *research and development* (which include technological development, diffusion and transfer); *finance and capacity development*; and *awareness raising*. This book focuses on climate mitigation, which has been gaining prominence in Africa. The growing focus on climate mitigation has occurred despite sometimes being overshadowed by the more fundamental need for the continent to adapt to climate change. The authors believe that this timely contribution will add to the burgeoning literature and discussion on the green economy and climate mitigation.

The book focuses on several aspects that relate to the risks and opportunities presented by the green economy in the African context. It also seeks to address ways in which governments can make a smooth transition to low-carbon-driven economies. The book addresses thought-provoking questions: Is the green economy a new paradigm or sustainable development repackaged? How does the green economy relate to green economic stimulus packages? What is Africa doing to harness the new green growth path? What is carbon accounting, and why should Africa engage with this concept within the green economy context? What impacts does a contested global climate-negotiating regime have on the green economy and a carbon-pricing future? What is the role of multilateral development banks in climate and carbon asset financing? In the context of forestation in Africa, how can African governments engage with reducing emissions from deforestation and degradation? How can we initiate and implement effective policies and modalities to ensure that Africans are paid for the environmental services they perform? How does the green economy affect African trade and economic growth? What role should carbon taxation play in a green economy in Africa?

The authors of this book share a clear vision of a healthier and sustainable global environment. Their contribution will certainly help us address the concerns and challenges of the complex subject of sustainable development and climate change mitigation. The interdisciplinary nature of the author team brings together many years of research, teaching and community-engagement practices associated with institutions of higher learning. The authors and associated publishing partners of this remarkable project deserve our sincere congratulations for this profound and transformative piece of work in a very important area of

national, continental and global significance. I have no doubt that it will serve as a valuable reference for everyone who is concerned with the future of our environment.

Professor Mandla S. Makhanya
Principal and Vice Chancellor
University of South Africa

Preface

This book addresses current thinking in the field of sustainable development, and in particular the transition to a green global economy and its implications for Africa. Although the book is a direct product of the Exxaro Chair in Business and Climate Change, hosted by the Institute for Corporate Citizenship, which falls within the College of Economic and Management Sciences (CEMS), its production is the result of efforts of a number of programmes and initiatives at the University of South Africa (Unisa). These programmes and initiatives include the Vice Chancellor's Sustainability Mainstreaming Programme, the CEMS Going Green Initiative, CEMS research flagships, which include business and climate change, and the Exxaro Chair in Business and Climate Change Research Associates Programme. The book is also a product of the 17th Session of the Conference of Parties' collaborative work carried out by the Institute of Global Dialogue, the Africa Institute of South Africa and Unisa's Institute for Corporate Citizenship.

The topic of the green economy and climate mitigation was selected in view of the developments since the global financial crisis of 2008. This financial crisis made the world realise the importance of addressing environmental and sustainable development concerns, and especially addressing climate change more urgently and in a holistic manner as a result of the financial crisis.

Acknowledgements

The Green Economy and Climate Mitigation book project leader and editor, Professor Godwell Nhamo, wishes to thank the following organisations and people for their generous support financially and in kind. Exxaro Resources Ltd is hereby acknowledged for its financial support since 2008, now running in the second phase from 2011–2015. The Unisa Principal and Vice Chancellor, Professor Mandla Makhanya, is recognised for his scholarly and visionary support for this project, his swift response in endorsing the book project and for volunteering to write its foreword. The authors, blind peer reviewers, editors from Unisa Edit, the CEMS Deanery, and the Institute for Corporate Citizenship had an invaluable input in the writing process. Professor Neil Eccles, you really know how much you contributed in terms of ideas and refinement of this work. Please keep this spirit in the future. The publishers, Africa Institute of South Africa, are hereby acknowledged for a quality product.

Professor Godwell Nhamo

Programme Manager: Exarro Chair in Business & Climate Change
Institute for Corporate Citizenship
University of South Africa

About the sponsor and the Exxaro Chair in Business and Climate Change

Exxaro Resources Ltd

Exxaro Resources Ltd is one of the largest South African-based diversified resources companies, with a well-balanced portfolio including coal, mineral sands and base metals, with a significant indirect interest in iron ore. It is a top 40 company listed on South Africa's securities exchange, the JSE Limited.

The group's strategic focus, record of innovation and commitment to sustainable development underpin its promise to contribute to the economic growth of South Africa. In 2007, Exxaro's leadership recognised that it had to deal with energy in its broadest context (shortages, rising costs, climate change, environmental concerns) in order to remain competitive and sustainable for the benefit of all its stakeholders.

Exxaro's response to energy and carbon-related risks have been multi-faceted. An internal Clean Energy Forum was established in 2007, which led to the formulation of the Energy and Carbon Management Framework in 2008 and a Climate Change Position Statement finalised in 2010. A Climate Change Response Strategy is also being devised. The Energy and Carbon Management framework has also seen the company's general risk register being updated to take account of climate change risks. Exxaro participates in the energy debate at a local, national and international level.

In 2009 Exxaro embarked on the formation of a new energy company aimed at generating power for the country through a mix of renewable and cleaner energy sources. The group is also identifying opportunities in strategic minerals, which will be necessary for the low carbon economy, and hedging through investment in businesses, which will be prominent in a low-carbon economy.

The company's participation in the international Carbon Disclosure Project has facilitated the introduction of processes to measure the company's carbon emissions and provides valuable insight into the company's overall emissions performance and thus allows for clear

target setting in its energy strategy. Exxaro achieved a tied-fourth highest score in the CDP 2010.

The Exxaro Foundation and Exxaro Chairman's Fund are committing over R15 million a year in sponsoring three chairs at different universities. They are the Exxaro Chair in Business and Climate Change at the University of South Africa, the Exxaro Chair in Business and Biodiversity at the University of Pretoria and the Exxaro Chair in Global Change and Sustainability at Wits University. These chairs are actively pursuing advocacy, research and training in their respective areas of specialisation. The results will be shared nationally and internationally.

Responsible business practices remain a long-term value proposition for Exxaro. Based on universal values and accountability, it makes business sense to invest in creating a sustainable environment in which to operate.

Exxaro Chair in Business and Climate Change

Unisa, in partnership with Exxaro Resources Ltd (Exxaro) established an endowed Chair in Business and Climate Change – the Exxaro Chair in Business and Climate Change (Chair) in 2008 with a life span of three years. Following the Chair's success, Exxaro renewed the Chair's mandate for a further five years to 2015. The vision of the Chair is 'To create a centre of excellence in business and climate change research, education and advocacy oriented community engagement'. Its mission is 'To support South African and African stakeholders (including business, government and civil society) in their quest to reduce GHG emissions and adapt to climate change through relevant and cutting edge research, education and advocacy-oriented community engagement programmes. The Chair is mandated to operate in three thematic areas namely: (1) research; (2) academic programme development (including training and capacity building); and (3) advocacy oriented community engagement.

About the contributors

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Godwell Nhamo is an Associate Professor and a Programme Manager for the Exxaro Chair in Business and Climate Change. The Chair is hosted by the Institute for Corporate Citizenship that falls within the College of Economic and Management Sciences at the University of South Africa. Professor Nhamo holds a PhD from Rhodes University and did his postdoctoral work with the University of Witwatersrand (both in South Africa). He has great interests in Business and Climate Change; Global Climate Change, Climate Policy Negotiation Regimes; as well as General Environmental Management and Policy. Some of his current responsibilities are teaching, research and training in corporate citizenship, sustainability sciences, climate policy, green economy as well as business and climate change. He has spent the past 15 years in the research, consulting and academic worlds. Professor Nhamo has published widely across his areas of research interests.

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Abbreviations and acronyms

AAU	Assigned Amount Units
ACAD	African Carbon Asset Development
ACF	African Carbon Facility
ACMAD	African Centre of Meteorological Applications for Development
ACR	American Carbon Registry
ADB	Asian Development Bank
AFD	Agence Française de Développement
AfDB	African Development Bank
AFDF	Africa Development Fund
AFOLU	Agriculture, forestry and other land uses
AGF	Africa Green Fund
AGRHYMET	Agro-Meteorology and Hydrology Regional Centre
AHWG	Ad Hoc Working Group
BAE	Basic accounting equation
BASIC	Brazil, South Africa, India, China
BTA	Border tax adjustment
CAPM	Capital Asset Pricing Model
CAR	Climate Action Reserve
CBD	Convention on Biological Diversity
CBFF	Congo Basin Forest Fund
CBFP	Congo Basin Forest Partnership
CCAR	California Climate Action Registry
CCBA	Climate, Community and Biodiversity Alliance

CCLA	Climate Change Level Agreements
CCS	Carbon capture and storage
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
CEMS	College of Economic and Management Sciences
CER	Certified emission reduction
CH ₄	Methane
CIF	Climate Investment Fund
ClimDev-Africa	Climate for Development in Africa Fund
CMP	Conference of the Meeting of Parties
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalence
COMIFAC	Central African Forests Commission
COP	Conference of Parties
COP16	16th Session of the Conference of Parties
COP17	17th Session of the Conference of Parties
CTF	Clean Technology Fund
DEFRA	Department of Environment, Food and Rural Affairs
DMC	Drought Monitoring Centre
DRC	Democratic Republic of Congo
DTI	Department of Trade and Industry
EBRD	European Bank for Reconstruction and Development
ECX	European Carbon Exchange
EIB	European Investment Bank
EPA	Environmental Protection Agency
ERU	Emissions reduction unit
ETF	Environmental Transformation Fund
ETS	Emissions trading scheme
EU	European Union

EUA	European Union Emissions Allowances
EU-ETS	EU Emission Trading Scheme
FAO	Food and Agriculture Organization (of the United Nations)
FCPF	Forest Carbon Partnership Facility
FDI	Foreign direct investment
FIP	Forest Investment Programme
FSCF	Fast-Start Climate Finance/fast-start climate funding
G77	Group of 77
GAAP	Generally accepted accounting practice
GATT	General Agreement on Tariffs and Trade
GCCA	Global Climate Change Alliance
GDP	Gross domestic product
GEF	Global Environment Facility/Global Environment Fund
GHG	Greenhouse gas
GIS	Geographical information system
GPG	Good practice guidance
GS CER	Gold Standard Certificate of Emissions Reduction
H1	First half of the year
HFCs	Hydrofluorocarbons
HVAC	Heating, ventilation, air conditioning
IAS	International Accounting Standards
IBRD	International Bank of Reconstruction and Development
I-CAPM	Intertemporal Capital Asset Pricing Model
ICT	Information and communications technology
IDB	Inter-American Development Bank
IEA	International Energy Agency
IETS	International Emissions Trading Scheme
IFAD	International Fund for Agricultural Development

IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
IGAD CPAC	Intergovernmental Authority on Development Climate Prediction and Application Centre
IIC	Inter-American Investment Corporation
IMF	International Monetary Fund
IPAP	Industrial Policy Action Plan
IPCC	Intergovernmental Panel on Climate Change
IsDB	Islamic Development Bank
JBIC	Japan Bank for International Cooperation
JI	Joint Implementation
JICA	Japan International Cooperation Agency
JSE	Johannesburg Stock Exchange
KfW	Kreditanstalt für Wiederaufbau
LDCF	Least Developed Country Fund
LDCs	Least Developed Countries
LTMS	Long-Term Mitigation Scenario
LULUCF	Land use, land-use change and forestry
MDB	Multilateral development bank
MDG	Millennium Development Goal
MPC	Marginal private cost
MRV	Measuring, reporting and verification
MSC	Marginal social cost
Mt	Metric tonne
MtCO ₂	Metric tonne of carbon dioxide
N ₂ O	Nitrous oxide
NADBank	North American Development Bank
NAP	National allocation plan
NGAC	New South Wales Greenhouse Gas Abatement Certificate

NGO	Non-governmental organisation
NO _x	Nitrogen oxide
OECD	Organization for Economic Cooperation and Development
PAS	Publicly available specifications
PCF	Prototype Carbon Fund
PFCs	Perfluorocarbons
PPCR	Pilot Program for Climate Resilience
REC	Renewable Energy Certificate
REDD	Reducing emissions from deforestation and degradation
REDD+	Reducing emissions from deforestation and degradation (plus)
REFIT	Renewable energy feed-in tariff
RMUs	Removal Units
SADC	Southern African Development Community
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCCF	Special Climate Change Fund
SCF	Strategic Climate Fund
SECCI	Sustainable Energy and Climate Change Initiative
SEFA	Sustainable Energy Fund for Africa
SFD	Structured Finance Department
SF ₆	Sulphur hexafluoride
SIDS	Small island developing states
SMEs	Small and medium-sized enterprises
SNV	Stichting Nederlandse Vrijwilligers (Netherlands Development Organisation)
SPREP	Secretariat of the Pacific Regional Environment Programme
SREP	Scaling-Up Renewable Energy Program in Low-Income Countries

UK	United Kingdom
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDESD	United Nations Decade of Education for Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
Unisa	University of South Africa
VAT	Value-added tax
VCS	Voluntary Carbon Standard
VCU	Voluntary Carbon Unit
VER	Verified/Voluntary Emissions Reduction
VER+	Verified Emissions Reduction Plus
WBCSD	World Business Council for Sustainable Development
WCED	World Commission on Environment and Development
WCS	World Conservation Strategy
WEF	World Economic Forum
WRI	World Resources Institute
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization
WWF	World Wide Fund for Nature

The green economy and climate change

Risks and opportunities for Africa

Godwell Nhamo

Introduction

The first decade of the twenty-first century was characterised by breakthroughs in terms of creating platforms that enhance the implementation of sustainable development. These include surges in green consumerism, high awareness levels of carbon emissions and carbon footprints, a degree of urgency in addressing sustainable development and establishing the close link between the climate change crisis and the financial crisis. The green-economy agenda is certainly one of the decade's prime 'discoveries'. The green economy brought new levels of willingness to genuinely merge the environment and the economy, a task that has taken more than two decades since the publication of the report *Our common future* in 1987.¹ One might also be correct to label the twenty-first century as the century for individual decision making regarding environmental stewardship, especially the need to address the negative impacts associated with climate change. This century also stands out as the one in which there has been more emphasis on global cooperation and on encouraging countries not normally involved in resolving global crises to take part in doing so.

At the centre of the green economy is the need to move away from the carbon-intensive paradigm to what is now popularly termed the low-carbon economy. The low-carbon economy invites major investments in the development of green-economic policies and institutional

frameworks. These include renewable energy, energy efficiency, involvement in the carbon market, clean and environmentally sound technologies, awareness raising, the creation of green jobs and general protection of life-supporting ecosystems, like biodiversity and water. Overall, the principles of the green economy acknowledge that the purpose of these policies and frameworks is to improve and protect the quality of life mainly through poverty eradication and the institution of good governance. The green economy also challenges humanity to realise the opportunities for growth presented by addressing climate change.

Climate Change Discourse

Climate change influences developments in and discussions about the green economy. Climate change is one of the new growth frontiers in Africa. Therefore, it is important that readers are aware of the fundamental issues involving climate change, which is the main purpose of this section. For a number of decades, and especially the last quarter of the twentieth century, the issue of climate change was dominated by scientific discourse: is climate change happening or not? This was the main question and it was put to rest by the publication of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report in 2007.² The report declared that the scientific basis for global warming resulting in climate change was irrefutable.

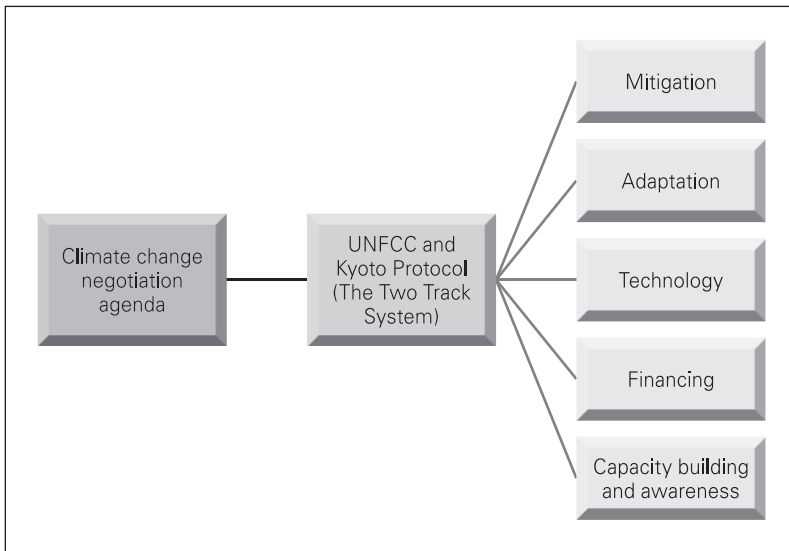
Although global warming may be attributable to both natural and human-induced greenhouse gases (GHGs), such as carbon dioxide, nitrogen oxide and methane, a global consensus emerged that unsustainable human consumption patterns driven by the desire to industrialise were the main causes of increasing levels of GHGs in the atmosphere. Follow-up documentation revealed that the figures presented in the Fourth Assessment Report could even be understated. The emission of GHGs, particularly carbon dioxide, and consequent climate change are the focus of increasing international concern.³ Global leaders and other key stakeholders have agreed that we should keep global temperature rises to no more than two degrees Celsius above their pre-industrial levels. In the UN Climate Change Conference held in Cancún, Mexico, in 2010, other advocating groups called for the rise in the global temperature to be maintained below one and a half degrees Celsius above pre-industrial levels.⁴

Climate science forms the basis of the global climate negotiation regime, which is informed by the United Nations Framework Convention

on Climate Change (UNFCCC)⁵ and the Kyoto Protocol of 1997.⁶ The UNFCCC and the Kyoto Protocol create what is commonly referred to as the two-track system in climate negotiation. The Kyoto Protocol came into force in February 2005 after Russia deposited the ratification instrument that completed the required number of instruments for the treaty to enter into force.⁷ The UNFCCC provides for an equitable share of responsibilities in terms of addressing the negative impacts of climate change. The industrialised nations are required to do more with regard to addressing the negative effects of climate change because those nations have the capacity to do so and are responsible for the problem. The developing nations are expected to address climate change in accordance with their respective capacity to do so. The Kyoto Protocol stipulated GHG emission-reduction quotas for 37 industrialised countries (referred to in the climate architecture and literature as Annex 1 countries⁸). Annex 1 countries are due to collectively reduce their GHG emissions by an average 5,2 per cent based on the 1990 levels between 2008 and 2012.⁸ Technically, the period 2008–2012 marks the first GHG emission-reduction commitment under the Kyoto Protocol. The year 2012 has been mistakenly referred to as the expiry of the Kyoto Protocol in many circles and forums. Hence what is being negotiated now under the Kyoto Protocol is the possibility for a second commitment period, which might have a different set of regulations altogether.

Climate mitigation deals with the manner in which countries put in place measures to reduce GHG emissions. This is done in line with scientific confirmations that increasing concentrations of GHGs in the atmosphere cause global warming, which leads to climate change. Over the years, five main focus areas have emerged under climate negotiation regimes: mitigation, adaptation, technology transfer, finance and capacity building and awareness raising (see Figure 1.1). The negotiations take place within a two-track system, which embraces negotiations under the UNFCCC Conference of Parties (COPs), with COPs serving as the Conference of the Meeting of Parties (CMPs) to the Kyoto Protocol. By December 2011, there should be 17 COPs and seven CMPs.

Traditionally, climate change mitigation has been an agenda driven by Annex 1 countries. However, with the changing pattern of global GHG emissions that has witnessed China overtake the US as the leading emitter in 2006, there has been a paradigm shift towards having mitigation as a twin pillar to adaptation in addressing climate change, particularly in emerging nations. South Africa has been recognised as the leading African nation that must show responsibility in terms of

Figure 1.1 Negotiation focus areas

mitigating climate change.⁹ Other African powerhouses include those in the fast-developing category, such as Angola, the Democratic Republic of Congo, Egypt, Kenya, Libya and Nigeria. For a long time, adaptation has been – and according to future trajectories, will be – pushed as the preferred intervention measure against climate change in Africa.

Following COP13, which took place in Bali, Indonesia, a road map was developed that would have witnessed a second commitment to the Kyoto Protocol by 2009.¹⁰ The year 2009 has come and gone, and the world leaders have failed to reach an agreement on the nature of the second Kyoto Protocol commitment period. During COP15 in Copenhagen, Denmark, the Copenhagen Accord emerged,¹¹ a political agreement negotiated outside the two-track UN system. The Copenhagen Accord was a weak agreement, its architecture the brainchild of the US, Brazil, South Africa, India and China bloc of nations (BASIC).¹² Although the US came to the table in Copenhagen, its leadership in climate negotiation has been questioned, and to date the US has refused to ratify the Kyoto Protocol. Although negotiations during COP16, which took place in Cancún in 2010, made significant progress in both negotiation tracks, the Copenhagen hangover haunted proceedings and again there was no agreement on the second Kyoto Protocol commitment period.¹³ Annex 1 countries are still questioning the wisdom of excluding heavy

non-Annex 1 polluters belonging to the BASIC bloc from emission quotas. Japan, the very nation from which the Kyoto Protocol derives its name, has indicated that it will not be participating in the second Kyoto Protocol commitment period.¹⁴ The US and some developing nations are reluctant to commit to the second Kyoto Protocol architecture. Russia has indicated that it will not take part in the second Kyoto Protocol commitment period, and the US has confirmed it will not be considering ratifying the Kyoto Protocol.¹⁵ The main reason cited is that the reduction of GHGs should be mainly done through domestic policies that take into consideration national interests and circumstances.¹⁶

To facilitate mitigation and adaptation in Africa, finance has been identified as a barrier and is prioritised on the climate negotiations agenda. Although financial considerations were included as part of the Bali road map and action plan, concrete measures were put in place in Copenhagen during COP15 through the Copenhagen Accord, which established the Green Climate Fund.¹⁷ The Green Climate Fund called for the mobilisation of US\$30 billion (US\$10 billion annually between 2010 and 2012) and an escalation to US\$100 billion annually by 2020. This money will be made available to non-Annex 1 countries for projects aimed at addressing climate change. This book will consider in depth the provisions of the Copenhagen Green Climate Fund and how it is being distributed.

In Cancún, a total of 25 agreements were drawn up, referred to as the Cancún Agreements.¹⁸ The agreements were developed under the UNFCCC and Kyoto Protocol tracks. The deliberations for the UNFCCC COP take place under the Ad Hoc Working Group on Long-term Cooperative Action (AHWG). A summary of the Cancún Agreements under the two tracks is provided in Table 1.1.

There was greater success regarding the Cancún Agreements under the UNFCCC track than under the Kyoto Protocol track. The AHWG on Further Commitments for Annex 1 Parties under the Kyoto Protocol still had work to do leading up to COP17 in Durban, South Africa. The main concern is that there should not be a gap between the first and second Kyoto Protocol commitment periods. To this end, the world is expecting a breakthrough in a post-Kyoto Protocol deal, a deal that is legally binding and fair.

Fearing a repeat of the Copenhagen COP15 failures, UNFCCC Executive Secretary Christiana Figueres was happy to note the progress made in Cancún. The Cancún Agreements were described as 'a balanced package of decisions that set all governments more firmly on the

Table 1.1 Cancún Agreements under the UNFCCC and Kyoto Protocol tracks

Track	Major agreements
UNFCCC	■ Shared vision for long-term cooperative action ■ Enhanced action on adaptation ■ Reducing emissions from deforestation and forest degradation plus (REDD+) ■ Enhanced action on mitigation – nationally appropriate mitigation actions ■ Use of (carbon) markets ■ Finance, technology and capacity building
Kyoto Protocol	■ AHWG to complete work soon to avoid gap between first and second commitments ■ Land use, land use cover and forestry mechanism to continue ■ Annex 1 countries to raise ambition regarding GHG-emission reductions ■ 1990, or the base year or period determined thereof, used as base year ■ Emissions trading and project-based mechanisms shall continue

path towards a low-emissions future and support enhanced action on climate change in the developing world.¹⁹ In Figueres’ eyes, Cancún had done its job to re-ignite the beacon of hope and restore faith in the ability of the multilateral climate change process to deliver results. The countries had proved that they could put behind them the Copenhagen COP15 fiasco and work together in search of consensus on a common cause. Transparency was also highlighted as one of the key points of success in Cancún. With the Cancún agreements, governments worldwide were believed to have made a statement on their quest to move towards a future entailing a low-carbon and green global economy.

Outline of this Book

Chapter 2 addresses the current hotly contested issues that seek to re-fine understanding of the green economy and sustainable development paradigms. Volumes upon volumes of literature discussing the concept of the green economy have emerged since 2008, a year known for the global financial meltdown. As the green economy takes root across all the economic sectors and many political fronts, questions have emerged not only in Africa, but globally. Among such questions are those seeking to clarify the differences and/or similarities between the green economy and sustainable development paradigms. And these questions have not

evaded the UN system either – the Rio+20 Summit to take place in Rio de Janeiro, Brazil, in 2012 will address these twin paradigms. During its preparatory meeting to the Rio+20 Summit, the G77+China group of nations issued a statement in May 2010 that sought to dispel a school of thought that envisages the green economy as a new paradigm that might replace sustainable development. The statement went further and called for a need to assess whether the new concept of the green economy may lead to a duplication of efforts or an attempt to sideline the concept of sustainable development and its requirements. Drawing from these discussions, this critical chapter informs Africans and other interested stakeholders of the authors' thinking in terms of the relationship between these concepts.

Chapter 3 grapples with the contentious issue of environmental financing through green stimulus packages, with a specific focus on challenges and opportunities for Africa. In August 2007, the US witnessed a sector-based financial crisis. This became a full-blown global financial crisis in 2008, as a result of subprime mortgage lending in 2008. The global financial meltdown was aggravated by the already existing global environmental crisis, mainly caused by climate change. In addressing the economic crisis, opportunities have emerged to address the environmental crisis and hence tackle both problems simultaneously. World governments and the corporate world have done this by using what are known as 'green fiscal stimulus packages'. The World Economic Forum (WEF) estimates that US\$250 billion is required annually until 2030 to address climate-related concerns in developing countries alone.²⁰ By February 2009, an estimated US\$3 trillion had been committed through the green fiscal stimulus packages that began in 2008, with the G20 pledging an additional US\$1,1 trillion during its London summit in April 2009.²¹ This chapter documents the way in which environmental financing, through selected global green fiscal stimulus packages, has led to a quick economic recovery and created a good foundation for long-term environmental financing. An estimated 15 per cent of the total global stimulus package has been committed to initiatives promoting transition to low-carbon economies, including the renewable energy, energy efficiency, automotive, smart grids and transport sectors. The chapter concludes by looking at how the global financial meltdown has created significant environmental financing options (e.g. the green fiscal stimulus packages) and the launching pad for exploring alternative development models and paradigms. There is clearly a connection between the environmental and economic crises and the need for new

and innovative sources of finance that address these two crises simultaneously. Hence Africa can draw significant lessons from the challenges and opportunities identified in the chapter and take appropriate policy decisions.

The subject matter of Chapter 4 is the discipline of carbon accounting and benchmarking, which is still new in Africa. Following the ratification of the Kyoto Protocol in 2005, carbon accounting has become big business, especially in the corporate world. More and more companies are moving towards carbon neutrality, an issue that requires that their carbon footprint be audited. At the global level, both the regulated and voluntary carbon markets demand that the unit of measurement to facilitate carbon trade (i.e. one tonne of carbon dioxide equivalent (CO_2e)) measured in Africa be the same as one tonne of CO_2e measured anywhere else in the world. To facilitate this, standards, protocols and guidelines for GHG accounting have been put in place internationally, most of which are in use in Africa and more specifically, South Africa. Among such standards and protocols are the ISO14064 dealing with GHG accounting and verification, and the GHG Protocol for corporate accounting and reporting standards. The green economy agenda also implies that carbon accounting will increasingly become the norm. Chapter 4 seeks to address, among other things, the following objectives: presenting the common standards, protocols and guidelines used in carbon accounting internationally and in Africa, with special reference to South Africa; raising awareness of the new discipline of carbon accounting; and presenting policy perspectives regarding carbon accounting in Africa.

Chapter 5 discusses the concept of carbon assets (also known as carbon credits), which have emerged from the need to address global warming in a contested global climate policy regime. Carbon assets are defined as GHG-emission reductions or removals achieved when project emissions are less than those that would occur in the absence of reductions or removals. Carbon assets were originally instituted as a result of the Kyoto Protocol of 1997. The need to reduce GHG emissions has, in turn, created the demand for carbon assets. Among the carbon assets from the compliance market mainly driven by the Kyoto Protocol are assigned amount units and certified emission reductions. Various other mandatory carbon assets emerge from domestic tax regimes. There is also the voluntary carbon market, which has created other carbon assets, which are discussed in depth in Chapter 5. This chapter seeks to answer the following questions: what are carbon assets? Will the market

for carbon assets continue to exist without a legally binding global climate policy regime? And what influence will all this have on Africa?

What really determines carbon pricing? This is the question Chapter 6 attempts to answer. A number of developments at the international level influence carbon pricing, particularly in the cap-and-trade systems. For example, phase 1 of the EU Emissions Trading Scheme (EU-ETS) witnessed carbon prices plummeting to nearly zero Euros as a result of the over-allocation of emissions allowances. This aspect was subject to rectification during the second and third phases. In addition, weak signals on the international climate negotiation front bring uncertainty to the carbon market, and Africa is not excluded from this. Phase 3 of the EU-ETS brought some form of certainty in the carbon market and guaranteed continuity with the ETS in the long term. The EU agreed to reduce its regional emissions by 20 per cent against the 1990 levels by 2020. A number of other cap-and-trade systems have also emerged. For countries like South Africa, understanding carbon price mechanisms will add value in terms of policy decisions.

Chapter 7 brings to Africa's attention the role of multilateral development banks (MDBs) in climate and carbon portfolio financing. The period 2007–2008 witnessed a proliferation of announcements regarding climate and carbon-asset financing. During this period, more than a dozen funding mechanisms were launched, including a number from MDBs. Carbon assets are among new portfolios emerging as part of climate financing initiatives by MDBs. Among the MDBs whose carbon-asset financing mechanisms will be considered in this chapter are the World Bank and the African Development Bank. Some of the funds discussed include the Climate Investment Fund (incorporating the Clean Technology Fund and the Strategic Climate Fund), the Forest Carbon Partnership Facility, the Prototype Carbon Fund, the Congo Basin Forest Fund (which finances projects that address climate change through reducing emissions from deforestation and degradation (REDD)), the African Carbon Support Project Fund, the ClimDev-Africa Fund, the African Water Facility and the Sustainable Energy Fund for Africa. The conclusion reached is that an opportunity is available for Africa to take part in climate financing and carbon-asset development, an initiative that will help alleviate the poverty on the continent and possibly move Africa closer to achieving the Millennium Development Goals. The involvement of MDBs in climate and carbon financing initiatives across the continent will allow Africa to be a major player in the global movement aiming to achieve a low-carbon and green global economy swiftly.

REDD+ is a key climate change mitigation measure. This is the central message contained in Chapter 8. REDD+ projects in Africa have the potential to reduce emissions by up to 16,1 metric tonnes of carbon dioxide equivalent (11,1 metric tonnes for less than \$3 per tonne) annually. More than \$8 billion of multilateral funds have been pledged by donors to finance REDD+ projects globally, some of which are specific to Africa. The Congo Basin Forest Fund administered by the African Development Bank is a typical example. REDD+ projects are needed to fulfil the Kyoto Protocol quotas and carbon offsetting. South Africa's Nedbank became the first African bank to announce carbon neutrality; its carbon offset credits are from a REDD+ project in Kenya. This chapter discusses multilateral REDD+ financing, which includes the Global Environment Facility, the EU-Global Climate Change Alliance, the Forest Carbon Partnership Facility, the UN-REDD+ Programme, the Congo Basin Forest Fund, the Copenhagen Green Climate Fund (including Fast Start Climate Fund), the REDD+ Partnership and the Forest Investment Programme. Chapter 8 also provides insights into the future of REDD+ financing in Africa and considers the central role it is likely to play. The authors conclude that multilateral REDD+ financing has made significant progress in Africa, especially with regard to funding REDD+ readiness projects. However, a call is made for African governments to come up with a home-grown REDD+ agenda that harmonises the needs of the continent with local needs. Suggestions that can be taken into account when designing such an agenda are discussed.

Chapter 9 addresses the need for climate-compliant trade regimes in Africa. This matter is portrayed through a case study focusing on South Africa. Such compliance is required so that nations remain competitive in a world moving towards low-carbon and greener economies. China, the UK and the US are South Africa's top three trade partners. The chapter analyses these three countries. Several climate change regulatory regimes have emerged among South Africa's trade partners. From October 2009, China has become the main export destination for South Africa. Even if China does not accept (mandatory) emission-reduction targets in 2013, countries from the developed north – among them, the UK, the EU and the US – have been pressurising China to reduce its huge carbon footprint. Global pressure to coerce China into reducing emissions will have reciprocal effects, as China will, in turn, persuade its key trade partners, like South Africa, to do likewise. Although many still believe China is not doing enough voluntarily to reduce its carbon

emissions, reports from that country show there is great momentum towards achieving a low-carbon economy. The UK and the EU are at advanced stages in terms of climate compliance. The new US administration has also joined the global movement to reduce emissions and is a pioneer in the area of regulating vehicle emissions and energy efficiency. The chapter utilises trade data from 2005 to June 2009 obtained from South Africa's Department of Trade and Industry. It provides an in-depth analysis of this trade data with a view to observing how climate change regulatory regimes among the trading partners are likely to impact on South African trade. Therefore, this chapter gives a wake-up call to (South) African businesses, politicians and other key stakeholders, including the labour force, to be proactive and work towards climate-compliant trade regimes. Although there is still more work to be done in this area, this chapter acknowledges that South Africa is moving at a relatively fast pace towards a climate-compliant economy.

Carbon taxation has generated much debate of late, especially given the fact that most African governments refuse to ring-fence the revenue for carbon and other environmental remedial measures. Chapter 10 discusses this subject. It describes the existing and potential role of carbon taxes as an environmental policy measure. The theoretical base of carbon taxes is discussed. Market-based interventionist policy measures (of which carbon taxes form part) are compared with decentralised and command-and-control policy measures. Certain countries' experiences with carbon taxation are also discussed. A comparison is made between carbon taxes and marketable permits. Other issues discussed include an overview of the welfare aspects of a carbon tax, environmental control cost and border adjustments. The chapter reveals that economic theory shows that carbon taxes could play an important role when designing policy that contributes to protecting the environment, particularly climate change. Despite this, the chapter reveals that carbon taxes do not play a major instrumental role in many countries' environmental policies. The chapter concludes by highlighting renewed interest in the use of carbon taxes to address the issue of carbon emissions in Africa.

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The green economy and sustainable development

Towards a common understanding

Godwell Nhamo, Soul Shava and Muchaiteyi Togo

Introduction

Paradigms come and go. One emerging paradigm that seems to have found easy global acceptance is that of the green economy. Volumes upon volumes of literature on this subject have emerged since 2008, a year known for the global financial meltdown. As the green economy takes root across all the economic sectors and many political fronts, questions are beginning to emerge both from politicians and scholars. Among such questions are those seeking clarity in terms of the differences and similarities between sustainable-development and green-economy paradigms. As part of the Rio+20 Summit to take place in 2012 in Brazil, the G77+China issued a statement in May 2010 that sought to dispel a school of thought that envisages the green economy as a new paradigm that might replace sustainable development. The statement calls for an assessment of whether the new concept of the green economy might lead to duplication of efforts or an attempt to sideline the concept of sustainable development and its requirements.

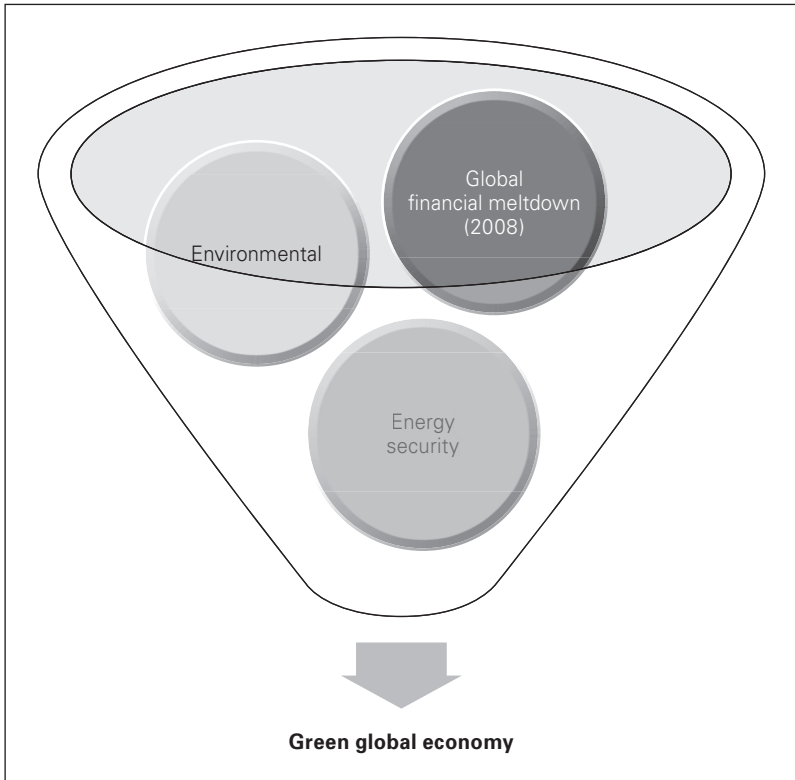
The methodology used in this chapter draws from critical discourse analysis. In addition, the chapter has been deliberately co-authored, with one author writing on the green economy and the other two writing on sustainable development. The write-ups were used as raw data to analyse themes and areas addressed by both paradigms and draw

conclusions on how they relate within the Rio+20 Summit and the emerging green global economy movement. This theoretical chapter reveals strong overlaps and potential conflicts between the green economy and sustainable development. However, the authors conclude that the green economy should be understood as a conduit and platform to fast-track the implementation of sustainable development globally and in Africa. Since 2008 the transition to a green economy has resulted in politically motivated mobilisation of financial and other resources. The resources have been a welcome development in the implementation of sustainable development.

Emergence of a Green Economy

New concepts, models and, ultimately, paradigms usually attract high levels of debate, contestation and testing both against the old and other emerging similar schools of thought. The green economy concept has not escaped this process. Much has been written about it, with conceptual frameworks and models being developed to the point that it is seen as threatening the existence of the sustainable-development paradigm. This section seeks to shed more light on the concept of the green economy, presenting definitions, conceptualisations and current thinking relating to sustainable development. With the overall global acceptance of the green-economy conceptual framework, one might have to be forgiven for addressing it as an emerging development paradigm that strongly contests the sustainable-development paradigm. A great deal of literature focusing on the green economy has emerged since 2008. However, one thing is certain: the transition to a green economy was not voluntary; it was the result of a series of crises that forced world leaders to act. Among these global crises are the environment (i.e. climate change, biodiversity loss and water insecurity), energy insecurity and the global financial meltdown (see Figure 2.1). Other global crises not represented in Figure 2.1 are food insecurity and poor governance.

As mentioned, the G77+China issued a statement in May 2010 that sought to dispel a school of thought that envisages the green economy as a paradigm that might replace sustainable development. The G77+China statement maintains: 'There is no need to redefine sustainable development. No valid argument can be sustained for abandoning the concept of sustainable development and replacing it with an imprecisely defined, abstract concept.'¹

Figure 2.1 Transition to a green global economy

Defining a green economy

In an earlier publication, Nhamo mentions that the term ‘green’ is often (mis)used in a number of ways: ‘For example, we talk and hear of green buildings, green financing, green economies, green wash, green accounting, green schools, green agriculture, green tourism, green procurement, green information and communications technology (ICT), the list goes on.’² The Globe Foundation (2010) concurs with observations made here and adds that the term ‘green economy’ means different things to different people. The term is also sweeping and difficult to quantify. In the light of this, the present authors look at some of the definitions of green economy. Collaborative Economics³ maintains that the green economy seeks to address the dual challenge of growing the economies while improving environmental quality.

The Irish High-Level Group on Green Enterprise⁴ takes the green economy as ‘encompassing a wide range of goods and services that fall under the scope of environmental and natural-resource use, management and protection’. The Organization for Economic Cooperation and Development defines the environmental goods and services sector as having activities that ‘produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems’.⁵ In another definition, Nhamo⁶ confirms that ‘[g]reen economies are so-called because they exhibit high levels of jobs created to address a myriad of environmental concerns’. In China, a low-carbon (green) economy is one that ‘maximises carbon productivity, improves capacities for adaptation to climate change, minimises the negative impacts of climate change, improves human development and accommodates both inter- and intra-generational needs’.⁷ The Globe Foundation⁸ says the green economy ‘is a fast-growing economic model that focuses on the creation of green jobs, the promotion of real, sustainable economic growth and the prevention of environmental pollution, global warming, resource depletion and ecological degradation’.

A review of selected definitions above shows that there is still no universally accepted definition of what constitutes a green economy. However, one can extrapolate and come up with the key components of the transition to a green economy, as follows:

- A green economy seeks to address the twin challenges imposed by environmental degradation and global economic growth (especially sparked by the global financial crisis).
- It focuses on creating green jobs.
- It emphasises the need to adapt to climate change (i.e. living with climate change).
- It seeks to mitigate climate change effects (by reducing greenhouse gas (GHG) emissions).
- It involves innovation and the development of environmental goods and services.
- National governments and other stakeholders should agree on a set of what they understand to be the green economy based on local circumstances and conditions.
- It seeks to improve human development.
- It has a huge global market value.

Conceptual framework for a low-carbon (green) economy

The green-economy initiative has managed to mobilise financial and other resources, a welcome development in addressing sustainable development. The green-economy concept has a narrow focus: it is centred on the transition to a low-carbon global economy. In addition, the green economy has managed to address climate change and biodiversity loss – twin key challenges of contemporary society. Central to the green-economy framework are the ideals of creating many jobs while moving away from a carbon-intensive global economy. Collaborative Economics⁹ distinguishes between what it calls the core green economy and adaptive green economy. The core green economy comprises businesses that supply goods and services that provide alternatives to carbon-based energy sources, conserve energy and natural capital and reduce pollution (particularly GHG emissions). In this model, the core green economy is enveloped within the adaptive green economy. The adaptive green economy, according to Collaborative Economics, comprises businesses founded on principles of sustainability. It also has businesses that ‘green’ their products, production processes and supply chains.

In its green-economy report,¹⁰ the local government of the island of Hawaii identifies 17 segments for the core green economy, similar, and at times identical, to those already discussed. New segments identified by the Hawaiian government are training and support, energy trading, carbon capture and storage, forestry, and governmental and regulatory administration. In British Columbia¹¹ the green economy focuses on six core components, which are subdivided into 22 subsectors (see Table 2.1).

The High-Level Group on Green Enterprise¹² focused on developing the green economy in Ireland. The green-enterprise sector is seen as central to developing Ireland’s smart economy. A smart economy (similar to a green economy) addresses climate change through the development and adoption of innovative environmental goods and services. The demand for such goods and services was viewed as huge and is set to grow. The four main segments of the business case for the green economy include renewable energy; energy efficiency and management (including eco-construction); waste management, recovery and recycling; and water and waste-water treatment. The Irish government also identified potential barriers to the development of a green economy, among them technical, regulatory and planning issues; unsustainable public

Table 2.1 Components of British Columbia's green economy

Core component (six in total)	Sub-components (22 in total)
Clean and alternative energy	■ Renewable energy ■ Bioenergy ■ Hydrogen and fuel cells
Energy management and efficiency	■ Energy management and power electronics ■ Energy-saving lighting and HVAC ■ Advanced batteries, energy storage and charging systems ■ Engines, power-saving automotive equipment and hybrid technology
Green buildings	■ Architecture, community design and green infrastructure ■ Construction and building materials ■ Sustainable development, property management and real estate
Environmental protection	■ Pollution mitigation, control and remediation ■ Waste management, reduction and recycling ■ Water conservation and technologies ■ Carbon capture, storage and sequestration ■ Environmental consulting
Carbon finance and investment	■ Carbon finance and offsets ■ Investment and venture capital
Knowledge	■ Education and training ■ Research and development ■ Information and communication technology ■ Legal and accounting ■ Public administration and support organisation

Source Globe Foundation, 2010. *British Columbia's green economy: Building a low-carbon future*. Vancouver: Globe Foundation, p.6

procurement (leading to the promotion of green public procurement); lack of financing for green firms; and lack of an Irish green brand.

The green economy is also being propelled by industrialised countries that are obliged to reduce their GHG emissions under the Kyoto Protocol.¹³ The green economy is, therefore, being realised through the adoption of emission-reducing operations and practices, innovative new engineering processes and the deployment of environmentally sound technologies.¹⁴ Reskilling, in-service and pre-service education and training has grown to be big business in the green economy. Wind, solar, biofuel and biomass energy and waste-to-energy, as well as marine and small hydropower energy, complete the top five quick-turnaround sectors

driving green economies in 2008. Geothermal and energy efficiency are also among the top ten – in sixth and seventh positions, respectively.

In his State of the Nation address of 12 February 2011, the South African president, Jacob Zuma, portrayed the green economy as one of the many sectors with a high potential for job creation. To this end, the green economy was prioritised together with infrastructure development, agriculture, mining and beneficiation, manufacturing and tourism.¹⁵ Green-economy issues were also highlighted in South Africa's February 2011 budget statement. Finance Minister Pravin Gordhan¹⁶ observed that efforts to green the South African economy are not just about reducing the GHG emissions and dangers associated with a hotter future: the green economy must also offer significant opportunities to create jobs and reduce costs in the economy. South Africa's New Growth Path¹⁷ outlines an approach to accelerate growth and employment. Funding amounting to R800 million has been allocated to 2013 for green-economy initiatives, with a total of R2,2 billion allocated to environmental employment programmes over the medium term.¹⁸ An estimated 300 000 additional direct jobs are envisaged by 2020, of which 80 000 will be in manufacturing and the rest in construction, operations and maintenance. These jobs are predicted to rise to well over 400 000 by 2030. The jobs will be from natural-resource management and construction in the short to medium term and renewable energy construction and manufacture of inputs in the medium to long run.

Sustainable Development

Development (industrial and socio-economic) has in the past followed a pathway that distanced itself from the biophysical environment and primarily focused on economic returns. However, there is a growing realisation of the negative impacts of unsustainable human-development activities on the biophysical environment, as first brought to international attention by Rachel Carson's 1962 publication *Silent spring*,¹⁹ as well as evidence of the direct and indirect reliance of business entities on the environment, especially its ecosystem services. This inextricable link between development and the environment is the basis upon which the concept of sustainable development is premised. The thrust of sustainable development hinges on the need for human-development activities to take due consideration of the natural environment in which they operate, or, in other words, economic growth without environmental destruction.

Origins and history of sustainable development

The concept of sustainable development emerged from a realisation of the need to balance economic growth and social progress with environmental concerns.²⁰ It was conceived due to a calling by non-governmental organisations (NGOs), indigenous groups and international institutions like the UN to re-examine the concept of development. The primary focus of the concept has been the critical challenges posed by environmental problems, including global warming, deforestation, atmospheric pollution and depletion of the ozone layer and non-renewable resources.²¹

The United Nations Conference on the Human Environment (Stockholm 1972) is considered a landmark event in the history of the concept of sustainable development.²² In 1974 the concept of sustainable development was used by the Geneva World Council of Churches²³ as a bridge between environmental concerns and issues of poverty and deprivation.²⁴ Later, the International Union for the Conservation of Nature and Natural Resources referred to sustainable development in 1980. In 1980 the World Conservation Strategy (WCS) was created, a joint initiative of the International Union for Conservation of Nature and Natural Resources, the United Nations Environment Programme (UNEP), the World Wide Fund for Nature (WWF), the United Nations Food and Agricultural Organisation and the United Nations Educational, Scientific and Cultural Organization.²⁵ The WCS argued for conservation as a means to assist development and specifically for the sustainable development and utilisation of species, ecosystems and resources.²⁶ The WCS emphasised ecological conditions that must be met if the limits of human development were not to be surpassed. The WCS has three basic principles that focus on ecological issues, namely sustainable resource use, maintenance of biodiversity and preservation of ecosystems (life support systems).

In 1982 the World Commission on Environment and Development (WCED) was formed by the UN General Assembly with the task of identifying links between the environment and development in an attempt to reconcile economic growth and the environment. Sustainable development became prominent after the publication of *Our common future* (commonly referred to as the Brundtland Report) by the WCED in 1987.²⁷ The concept gained popularity at the 1992 Rio Earth Summit, and in 2002 at the World Summit on Sustainable Development, education for sustainable development was called for, and universities, among

other higher-education institutions, were tasked with playing a role through their functions and operations.

In 1992 at the UN Conference on Environment and Development, the second Earth Summit was held in Rio de Janeiro, Brazil. Among the key products, instruments and outcomes of the summit were the Rio Declaration, the Earth Charter, Agenda 21, the Convention on Biological Diversity, the Convention to Combat Desertification and the Framework Convention on Climate Change.²⁸ These outcomes still remain key guiding instruments for sustainable development today. A key aspect of Agenda 21 is its principles and actions on biodiversity and climate change. During the Rio Summit, sustainable development was the rallying cry with key stakeholders, among them politicians and business leaders, promising to take a new path for development that would marry the environment and economic pillars.

In 2002 the World Summit on Sustainable Development (WSSD), held in Johannesburg, South Africa, reaffirmed the global commitment of member countries to sustainable development. Its key outcomes were the Johannesburg Declaration on Sustainable Development and the Plan of Implementation for the WSSD.²⁹ The WSSD of 2002 identifies poverty eradication, changing unsustainable patterns of consumption and production, and protecting and managing the natural-resource base of economic and social development as the overarching objectives of sustainable development. On 1 January 2005 the UN launched the Decade of Education for Sustainable Development (UNDESD). The UNDESD's main aim is to promote education as a basis for a sustainable society and to integrate sustainable development into education at all levels and all areas of life.³⁰

Sustainable development: A plethora of definitions

Various organisations and coalitions have contributed definitions of sustainable development, and by 1996 there were more than 300 definitions.³¹ The most widely accepted definition is the one used in the Brundtland Report, 'development that meets the needs of the present without compromising future generations to meet their own needs'.³² The WCED (1987) explained sustainable development as balancing economic growth with environmental protection without stopping development altogether. According to the WCED, both growth and population size should be in harmony with the productive potential of the ecosystem for sustainable development to be pursued. The basis of

this thinking is the idea that it is possible to enter a new era of economic growth based on the sustainable development of environmental resources. The report recommends a redirection of development to balance environmental protection and economic development without necessarily stopping development altogether.³³ However, the definition is still subject to varied interpretations of and conflicting views on its meaning.

In trying to interpret the WCED's definition of sustainable development, Munier³⁴ identified its three main concepts as development, the present and the future. His explanation was that the development implied is not only about economic growth or progress, but also incorporates social progress, which emphasises equity and equality of opportunities (shelter, education, jobs, healthcare) and environmental protection to ensure the health of resources for the sake of future generations. The concept of the present was explained as the need to act in the present to achieve environmental and social advancement. The future was taken to imply the long-term future inhabited by the descendants of the present generation.

Edwards³⁵ explained sustainability using three 'E's – ecology/environment, economy/employment and equity/equality. He described ecology as incorporating systemic understanding of the indispensability of ecosystems to the continued existence of humanity and the limits that are inherent in the ecosystems. His concept of economic sustainability takes cognisance of the importance of providing secure employment while maintaining the health of the ecosystem. Equity was said to be about concern for one's neighbour in ecologically-based long-term development. Dresner³⁶ argues that the debate around the concept is more about equity and is not only about environmental concerns versus growth.

Although Banerjee³⁷ argues that the sustainable-development concept falls under the dominant economic paradigm and does not represent a major theoretical breakthrough, some believe that it brings about a new theory of development³⁸ or a new paradigm,³⁹ which is more balanced when compared to early development theories because of its inclusion of social and economic issues alongside environmental concerns. Within this framework, Mudacumura⁴⁰ argued for a general theory of sustainability characterised by economic, social, political, cultural, ecological and spiritual dimensions. He then proposed that these be bridged through three overall findings, namely societal empowerment, global networking and holistic thinking, and argued that these

create an enabling environment to realise the six identified dimensions of sustainability. His argument for societal empowerment is that development is about people's education and organisation. Empowered people attain a sense of security by being able to participate in debates about overall societal welfare and hence they gain control of their lives. Their consciousness is raised and their thinking processes are developed, giving them self-confidence and they become more assertive, which leads to further development through the exchange of strategic insights.

Mudacumura⁴¹ explained that global networking might lead to recognition of the fact that the environment has no boundaries and that there is increasing interdependence among people and nations. Development stakeholders are called to work together within and between countries to bridge the ecological, economic, social, political, cultural and spiritual dimensions while devising comprehensive development strategies. This may create an enabling environment for solving complex development issues and achieving outcomes that may be impossible for any nation to achieve alone, in order to improve the quality of life. Innovative agendas of various research institutions, governments and industries can also be interlinked. Mudacumura further argues that the holistic-thinking approach is necessary because of the multidimensional nature of sustainable development, meaning that it is an interconnection of social, economic, political, cultural and spiritual dimensions. Therefore, there is a need to think holistically in recognition of the interconnectedness of sustainable development.

The emerging definitions can be broadly categorised into four thematic areas: sustainable development as a concept, sustainable development as a goal, sustainable development as a movement and sustainable development as a practice.⁴² The following sections elaborate on each of these areas.

Sustainable development as a concept

The premise of the sustainable-development concept given in *Our common future* was the inextricable link between the environment (where we live) and development (what we do in an attempt to improve our lot in that environment). The concept incorporates the dynamic tension between poverty alleviation and environmental concerns (including climate change, loss of biodiversity, water scarcity, energy security, etc.). On the one hand there is the need for development to meet basic human needs, and on the other hand there is the need to sustain the environment, which is the source of resources required for human

development. The primary focus of sustainable development was, therefore, to achieve a balance between social equity, the environment and economic development.⁴³

During the WSSD in 2002 the emphasis was on the three pillars of sustainable development – economic, environmental and social – that are embraced in the WSSD slogan, ‘Care and respect for people, plant and prosperity’.⁴⁴ The focus of the economic pillar is economic growth that maintains a healthy balance with our ecosystem and provides an adequate material standard of living for all. The environmental pillar signifies the limited nature of environmental resources for economic growth. Development should, therefore, stay within the biophysical carrying capacity of plant life. The social pillar emphasises the need to address human inequality, social injustice and poverty by providing systems of governance that propagate values that people want to live by. These three pillars must be integrated in order to achieve sustainable development.

Sustainable development as a goal

The focus on achieving sustainable development has led to a goal-oriented approach towards sustainable development. Accompanying the goals sets of sustainable development indicators and targets have emerged to measure the achievement of these defined goals. The sustainable development goal approach is reflected in the UN Millennium Development Goals (MDGs) to be attained by 2015.⁴⁵ For certain countries, including South Africa, the MDGs should be achieved by 2014.⁴⁶ The eight MDGs for sustainable development are:

- to eradicate extreme poverty and hunger,
- to achieve universal primary education,
- to promote gender equality and empower women,
- to reduce child mortality,
- to improve maternal health,
- to combat HIV/AIDS, malaria and other diseases,
- to ensure environmental sustainability, and
- to develop a global partnership for development.

The emphasis of the MDGs is predominantly anthropocentric with the exception of the seventh goal, which focuses on environmental sustainability.

Linked to sustainable-development goals are sustainable-development principles. These include, for example, the principles for a green

economy.⁴⁷ This principle provides a common ethical framework for shared values and principles for the global community for attaining the goal of commitment to sustainable development and advancing progress towards a green economy. Further principles of sustainable development include equitable distribution of wealth, economic equity and fairness, intergenerational equity, gender equity, the right to development, international cooperation, sustainable consumption and production, safeguarding biodiversity and preventing pollution of any part of the environment. Linked to sustainable-development goals, targets and indicators are various reporting instruments, which include the ‘triple bottom line’ reporting coined by John Elkington⁴⁸ and championed by the World Business Council on Sustainable Development, as well as the new movement towards integrated reporting, popularised by the Institute of Directors Southern Africa’s King III Report.⁴⁹ The corporate sector is now expected to report on the three components of economic, environmental and social performance in an integrated manner.

Sustainable development as a movement

Sustainable development as a movement is reflected in emerging environmental groups, environmental watchdogs and environmental networks. Social movements are held together by a common ideology and strive to achieve certain general goals. Such movements have mushroomed, rallying behind the green-economy drive. These movements follow an activist approach and raise awareness of environmental issues and injustices, and promote certain environmental value systems. A large number of these movements – such as WWF, Greenpeace and Earthwatch – have an eco-centric focus, promoting a strong conservation ethic (e.g. deep ecology, payment for ecosystem services, reducing emissions from deforestation and degradation (REDD), eco-offices, eco-villages, ecotourism). Examples of sustainable-development movements within formal education in Africa include eco-schools, child-friendly schools and mainstreaming environment and sustainability in Africa through university partnerships in African higher-education institutions.⁵⁰ However, there is an increasing number of such movements that are more anthropocentric, with an emphasis on human rights, and responsive to socio-ecological issues (e.g. eco-feminism, environmental justice, food sovereignty). The weakness of movements is that most of them place emphasis on one stream of thought and tend to under-represent other aspects of environmental issues.

Sustainable development as a practice

Sustainable development can be promoted in environmentally friendly practices, such as sustainable agriculture, sustainable tourism, agro-forestry, organic agriculture, waste recycling, renewable energy, green buildings, green economy, cleaner production, eco-labelling of products, corporate greening, green jobs, corporate social responsibility, environmentally friendly technologies, sustainable use of water (e.g. water recycling and reuse), indigenous landscaping, energy saving, green consumption (buying environmentally friendly products), car sharing, manufacturing fuel-efficient or electric cars and cleaner production. Most of these practices are based on individual choice; some of them are driven by market pressure for environmentally friendly products; others are driven by government regulation.

Contestations and critiques of sustainable development

The WCED's definition of sustainable development was criticised for being based on economic rather than ecological rationality⁵¹ and for increasing divergence between the main sustainable-development concerns, namely environment and development.⁵² The definition is said to have a utilitarian tendency that views development in terms of consumption levels and emphasises intergenerational equity rather than interclass and international inequalities. It is also criticised for not adequately addressing the implications of internal and international power structures.⁵³ It is also said to be vague with respect to the concept of needs.⁵⁴

Banerjee⁵⁵ criticised sustainable development for privileging Western notions of environmentalism and conservation and problematising global survival as sustainable development, while leaving out the sustainability of local (peasant) cultures that depend directly on the biophysical environment for survival. He criticised the global sustainable-development discourse (evidenced by International Monetary Fund, UN, World Trade Organization and World Bank policies) for assuming that poverty rather than affluence is the problem. He exemplified this by comparing slash-and-burn agriculture, which is blamed for destroying forests, with timber logging by forest companies, which are rewarded with tax incentives for following 'sustainable practices'.⁵⁶ Jickling⁵⁷ considers the sustainability movement as being led by industrial nations whose interests shape agendas of major international meetings like the World Summit on Sustainable Development. The leaders of these nations divert people

from focusing on things that matter to activities of little importance to which people pay considerable attention.

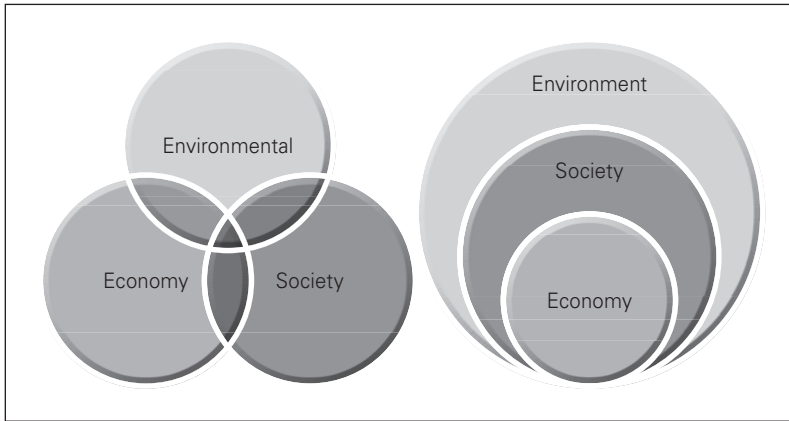
Sustainable development means different things to different groups, and there is no simple and straightforward definition or a central issue in which opinions overlap, but instead an evolving list of issues (climate change, management of water resources, poverty reduction, urban decay, etc) that differ between developed and developing nations.⁵⁸ Sustainability is challenging given the features of environmental and sustainable-development issues. These features are complex, contested and controversial, emergent, contextual and characterised by uncertainty and risk.⁵⁹ However, sustainable development still remains crucial because it has to do with humanity's chances of survival.⁶⁰

None of the interpretations of the concept of sustainable development are neutral. They clash and are in most cases mutually exclusive. Despite this, there is a general agreement that the present course of action is unsustainable, but there is a lack of agreement on what needs to be done.⁶¹ Fears are that sustainable development may be adapted as a 'greenwash' over unchanged consumption rates.⁶² Hatting,⁶³ therefore, suggests that the concept remain open to criticism and re-interpretation and argues that people should question themselves, their motives, and the basis of their actions, as well as their implications for others and the future. Sustainable development should not be considered a goal of a fixed state of harmony, but a process of change⁶⁴ that provides an opportunity to change people's ways of thinking in terms of learning how to live more sustainably.⁶⁵ A redefinition of sustainability issues at the local level is required because the sustainable-development problems crucial to developing countries are different from those of developed nations.

Tensions surrounding the concept of sustainable development have led to debate between environmentalists and economists.⁶⁶ This might be a result of both sides of the debate being appeased by the WCED's definition of sustainable development, whereby sustainability pacifies the environmentalists and development has the same effect on the economists.⁶⁷ Shriberg⁶⁸ referred to this debate in terms of anthropocentrism versus eco-centrism; weak versus strong sustainability; technological versus ecological sustainability; cornucopian versus neo-Malthusian; and economic versus biological sustainability.

Proponents of the anthropocentric/technological/weak sustainability argue that nature is resilient and hence there is a need to pursue economic development while looking for market and technological solutions to environmental problems. By contrast, eco-centric/

Figure 2.2 Contrasting weak and strong sustainability



Source: Adapted from Hatting, J., 2004. Speaking of sustainable development and values: A response to Alistair Chadwick's viewpoint responding to destructive interpersonal interactions. *Southern African Journal of Environmental Education*, 21, pp.157–165.

ecological/strong sustainability adherents call for change in social systems and search for the root causes of environmental problems to find systemic and innovative solutions.⁶⁹ The debate has resulted in different ways of modelling the concept of sustainable development, from weak to strong sustainability (see Figure 2.2). Weak sustainability considers the three dimensions of sustainable development – social, economic and environmental – as separate spheres with an overlap. Strong sustainability shows the environment, society and economy as nested systems suggesting stronger interdependencies and in which the ecological environment is the broader context in which everything takes place.⁷⁰

Strong sustainability shows that the economy, society and the environment are inextricably linked. What occurs in the environment is affected by society or the economy. Addressing problems occurring in the economy or society without considering the environment is a partial and incomprehensive approach to solving issues. Commenting on the strong sustainability model, Hatting says:⁷¹

The most important implication of the image of three embedded spheres...is that economic, socio-political and environmental considerations do not each have their own logic and values separate from the other spheres. Rather they are intertwined from the outset – to such an extent that a fundamental rethink is required of

everything that we up until now have conceptualised as economic activity, socio-political engagement and the environment.

This study aligns itself with the strong sustainability model. This model is used in systems thinking to represent complex interconnections among systems.⁷² It suggests a holistic approach to addressing sustainability problems. A methodology is provided for this by systems thinking. The model connotes that searching for solutions has to go beyond the individual by addressing relations and interconnections in complex systems. Given the multi-dimensionality of sustainable development, this model may help in conceptualising and understanding these issues.

The discourse of sustainable development also generated other contestations. Among them are those dealing with multiple interpretations, multiple definitions, achievability and the need to address the question of what is being sustained in sustainable development. These contestations will now be briefly discussed.

Multiple interpretations

Sustainable development has been interpreted differently by different sectors of the global community. Some sectors prefer the dualistic typology that emphasises the relationship between humankind and nature, whereas some prefer the tripartite and holistic approach that emphasises the social, economic and ecological dimensions of sustainable development. However, in both cases, an integrated approach to sustainable development can eradicate these differences. In addition, the rhetoric of sustainable development has been picked up by the business and industry sector and sometimes used in ways that defeat the goal of sustainable development and are perceived by environmentalists as unsustainable. This has led to arguments that sustainable development is subsumed under the dominant economic paradigm.⁷³

Multiple definitions

Sustainable development means different things to different people. Therefore, there is a lack of definitional precision, resulting in a multiplicity of 'sustainabilities'. Some people argue that the conceptual ambiguity of the term 'sustainable development', whereby it can be viewed as 'everything or nothing' (based on how sustainability is defined and for what purpose), weakens it as a goal.⁷⁴ According to this argument, if sustainable development means everything, then it probably means nothing at all. However, some argue that any attempt at precise definition

will have the effect of excluding those groups whose views are not expressed in the definition.⁷⁵ In addition, most definitions emerge from sustainable-development practices, and not external impositions.

Is sustainable development achievable?

The various approaches to sustainable development pose difficulties in uniformly quantifying and measuring success in implementing sustainable development. On the one hand, this points to the difficulty of establishing global standards or benchmarks for sustainable development. However, on the other hand, sustainable development can be perceived not as something to be measured, but as a framework for a lifestyle, culture or norm that transcends spatio-temporal measures. Lastly, the question of what precisely is being sustained in sustainable development has also added to the complexity. There is a lack of clarity as to what is being sustained in sustainable development: is it economic growth or the global ecosystem – or both? asks Banerjee.⁷⁶ At another level, sustainability issues have remained rooted in the old economic-development paradigm, whose key driver is the quest for more economic development.

Sustainable Development in an African Context

The aspect of context should not be divorced from the sustainable-development discourse. Generalising about global sustainability trends tends to mask local sustainability realities, which make it necessary to have a local rather than a universal definition of sustainable development. This section examines prevailing sustainability challenges in the African context.

The African environment and socio-economic system are highly vulnerable to the impacts of climate change,⁷⁷ and the ecosystem, together with the livelihoods of people, is threatened.⁷⁸ Challenges to the natural environment include climate change, deforestation, over-exploitation of resources, deterioration of marine and coastal ecosystems and water-quality issues.⁷⁹ Problems of poverty, food insecurity, war, HIV/AIDS, environment-related diseases, drought, water and sanitation are prevalent in Africa.⁸⁰

Wars in Africa have resulted in eight million people becoming refugees in 1996⁸¹ and, according to the UNEP, some countries are still affected by wars and violence. Poverty and food insecurity were also identified as some of the sustainability challenges in the continent. This is worsened by a lack of adequate water supply, which is likely to 'severely

constrain food production' further.⁸² The prevalence of HIV/AIDS leads to pressure on countries' health systems and economies. IGAD ICPAC also argue that many diseases in the continent are sensitive to climatic factors, and give examples of malaria, cholera and meningitis, which were found to positively correlate with environmental factors.

These sustainability challenges are compounded by low capacity to respond to environmental changes. The Intergovernmental Panel on Climate Change identified lack of economic development and institutional capacity as factors that make African countries highly vulnerable to climate change.⁸³ The UNEP (2008) argues that the continent has low capacity for adapting to climate change. Paden⁸⁴ notes high illiteracy rates of up to 40 per cent in Africa among individuals older than 15. According to Case,⁸⁵ the negative impacts of climate change in Africa are aggravated by other sustainability issues, including poverty, disease and high population density.

By using the human development index and the ecological footprint to assess the sustainability of countries, Wackernagel⁸⁶ showed that most countries in Africa do not meet the human development threshold of 0,8 and most have ecological footprints lower than 1,8 which is within the average biocapacity of global resources. Those countries with a high rate of human development have a high ecological footprint and those living within their ecological footprint have a low rate of human development. Notable is the fact that the 19 countries with the lowest human development indexes are in sub-Saharan Africa.⁸⁷

Sustainability challenges prevalent in Africa are not necessarily reflective of global sustainability challenges. Examples of contextual challenges noted above are poverty and food insecurity, high illiteracy rates and environmentally related diseases. According to Paden,⁸⁸ Africa, therefore, has to 'redefine the paradigms of its development to solve these problems in an African context'. However, owing to environmental diversity within the continent, there are geographical differences in sustainability challenges, which call for a local contextual redefinition of sustainable development.

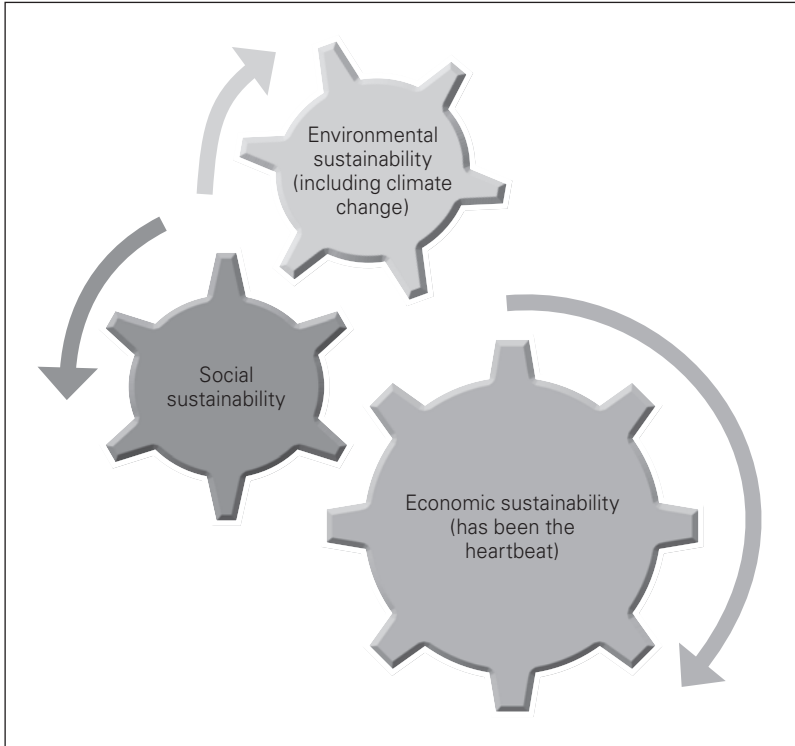
The Nexus: Diverging and Converging Points

There are many overlaps and potential conflicts between the green economy and sustainable development. However, the authors conclude that isolating the green economy concept should be maintained so that

it can be used as a conduit to fast-track the implementation of sustainable development globally.

In its historical context, the concept of sustainable development has emerged as a logical extension of arguments developed in environmental literature of the 1960s, 1970s and early 1980s on the negative ecological impacts of human development activities.⁸⁹ The sustainable-development concept, therefore, emerged from the need to address growing environmental concerns from human development activities that were reaching global proportions. Sustainable development was an attempt to bridge the chasm between environmental concerns about the increasingly evident ecological consequences of human activities and sociopolitical concerns about human development. However, two lines of environmental response approaches have emerged in the discourse of sustainable development.⁹⁰ On the one hand, there is a focus on maintaining natural landscapes and changing people's values and attitudes toward the environment – referred to as the eco-centric (bio-centric) or sustainability approach. The focus here is on the preservation of pristine nature and on changing human lifestyles (sustainable livelihoods) to reduce environmental impacts. On the other hand, there is a focus on the utilitarian value of nature (conservation) and developing environmentally friendly technologies. This has been referred to as the techno-centric/anthropocentric, or sustainable-development, approach. However, it should be noted that techno-centric responses entail in reality the use of (new) technology to seek solutions to problems created by (old) technology (consequently, such responses suggest solving the problem with the same thinking that created the problem).

In the African context, responses depicting extremes of the two response categories described above are evident. On the one hand, there has been an overemphasis on eco-centric activities in some countries, especially in the colonial era, to the extent that local communities have been forcibly evicted from their land and relocated to marginal areas, with minimal or no resources for livelihood sustenance in order to pave the way for conservation initiatives such as game reserves, national parks and designated indigenous forest areas, thereby depriving local communities of their resources and rights. This type of extreme eco-centrism has the problem that it accords biodiversity of species and ecosystems more rights than local indigenous communities, and prioritises environmental protection over human well-being. On the other hand, destructive and unsustainable development activities have been implemented under the

Figure 2.3 Conceptualising sustainable development in the 21st century

banner of job creation and poverty alleviation, with debilitating impacts on the natural ecosystems that sustain human livelihoods.

Despite these two seemingly diametrically opposite response streams within sustainable-development discourses, in reality an integrative approach that marries the two streams of thought emerges as the best framework for sustainable development. On the one hand, one cannot overlook the value of natural ecosystems and biodiversity as our resource base and in providing life-support services. On the other, we cannot ignore the need for human development to meet basic human needs. The former cannot be emphasized at the expense of human sustenance, particularly in developing countries where poverty levels and dependence on natural ecosystem resources are high. And the latter needs to take into account the need to sustain the environmental resource base.

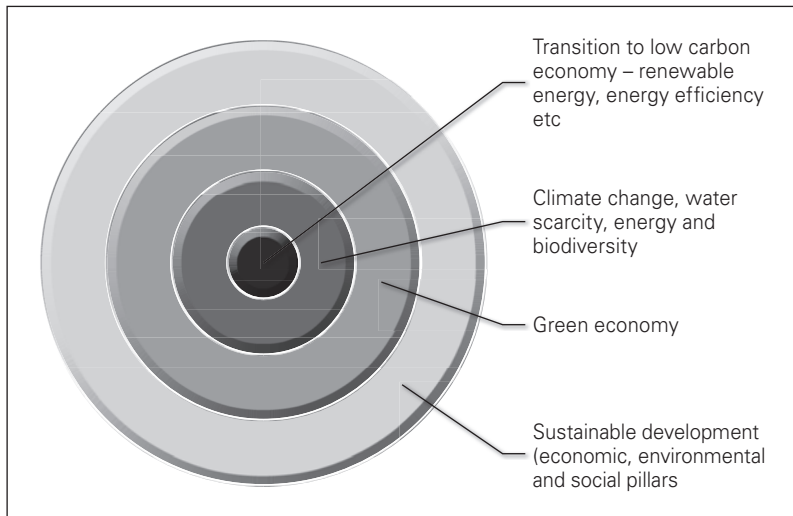
From the authors' analysis of the two concepts of sustainable development and the green economy it emerges that the former is now a fully

fledged development paradigm. This paradigm was placed on the global map by the 1987 publication *Our common future*. Since then, over two decades have passed and key global actors – governments, academics, business and NGOs – have accepted sustainable development as an alternative model to economic development. Sustainable development rests upon three universally accepted pillars: economic sustainability, social sustainability and environmental sustainability. However, economic sustainability still dominates our growth models and development agenda globally and in Africa. Figure 2.3 graphically represents the dominance of the economic-sustainability agenda.

Unlike the more streamlined understanding that has been achieved of the green economy, which focuses mainly on addressing climate change, sustainable development has remained very abstract, a feature that has resulted in failure to make progress when it comes to its implementation. Sustainable development and sustainability have come to mean anything, and this probably means that sustainable development means nothing at all. At the core of the green economy is the motive to move towards a low-carbon economy. This has witnessed heavy investment in renewable energy and energy efficiency. Green buildings and rapid urban transport systems are other key elements. The green economy also emphasises the need to create green jobs and reskilling.

The green economy is still a new phenomenon, having been born in 2008 due to the need to address the global financial crisis. In the process, global leaders thought of taking advantage and in the process address climate change as one of the outstanding environmental concerns on the global agenda. The green economy has also brought into play a revamped environmental goods and services sector. The carbon market is certainly one new sector that has achieved greater levels through the green economy.

In terms of their similarities, the authors found that both concepts, the green economy and sustainable development, have been viewed disparagingly and critically, and undergone refinements. However, the green economy can be viewed as still in its infancy and there is no conclusive evidence that it has developed into a fully fledged development paradigm. Many definitions have emerged of the green economy, as they did since the first globally accepted definition of sustainable development in 1987. The two prefixes ‘green’ and ‘sustainable’ have both been (mis)used widely. For example, one can talk of green agriculture or sustainable agriculture, a green economy or a sustainable economy, a green building or a sustainable building, green politics or sustainable politics,

Figure 2.4 Green economy-Sustainable development nexus

green ICT or sustainable ICT, green education or sustainable education, etc. The list is endless.

There are many overlaps between the green economy and sustainable development. This certainly raises concerns, as was indicated by the G77+China. Central to the notion of the green economy is the need to be sustainable, particularly in addressing the twin crises of climate change and the 2008 global economic crisis. Figure 2.4 presents a conceptual framework linking sustainable development, the green economy, climate change and biodiversity loss and transition to a low-carbon global economy.

Both the green economy and sustainable development face challenges in terms of their conceptualisation and definitions. Stakeholders are faced with a challenge to understand these complex concepts, with a myriad of definitions having emerged at various stages. It was indicated that up to 300 definitions for sustainable development have been recorded in the literature. Many more definitions are emerging for the green economy as well. One can also witness the involvement of the UN organs and their desire to come up with globally accepted generic definitions. For sustainable development, it is the 1987 definition from *Our common future* that is most cited. For the green economy, the UNEP's 2011 definition is increasingly cited with a number of national green-economy strategies making reference to this definition.

We are also witnessing the increasing involvement of national governments as they domesticate the green economy through national policies and legislation. This is similar to what happened as national governments sought to domesticate sustainable development. Furthermore, both the green economy and sustainable development draw heavily from the desire to tap into the environmental goods and services sector, as well as from sustainability principles. The two phenomena seek to address human development. They also seek leverage through the application of environmentally sound technologies.

Conclusion

Generally, whereas the concept of sustainable development is more abstract, the green economy, and more so climate change, is more tangible. The green economy, therefore, acts as a conduit that demystifies the complexity and difficulty of implementing the concept of sustainable development. The green economy is also of immediate concern and relevance at localised and national levels. Sustainable development and its related discourses mark a transition in the development context from purely economic-based growth to a holistic model that embraces the three pillars of economic, environmental and social sustainability. Although still a challenge to implement today, there has emerged a global consensus that this kind of development model is the one that can see humanity live longer with the available resources and enable Mother Nature to rejuvenate itself. Directly emerging from the global focus on sustainable development are related shifts that emphasise different facets in a manner that seeks to implement sustainable development. Among these facets are environmental education, education for sustainable development, the green economy and the MDGs. The authors are convinced that the green economy is not a new paradigm. Instead, this is a new impetus and a conduit that has been assisting, and will continue to assist, global leaders and all stakeholders to realise the elusive platform upon which sustainable development can be implemented, measured, reported and monitored.

This chapter has revealed that there are several similarities and/or duplications between sustainable development and the green economy. However, these duplications only result from the fact that the green economy is one of the main focus areas drawing from sustainable development. Hence, if one were to represent this in a mathematical diagram, the green economy would be a subset contained within the sustainable

development set. The chapter also revealed that the green economy's main focus is the transition to a low-carbon economy. To this end, the desire to address the negative impacts of climate change informs the green-economy movement. The fear of the developing countries, particularly the G77+China, was noted, and rightfully so – there is no need to substitute the sustainable-development model with the green-economy narrative.

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Environmental financing through green stimulus packages

Challenges and opportunities

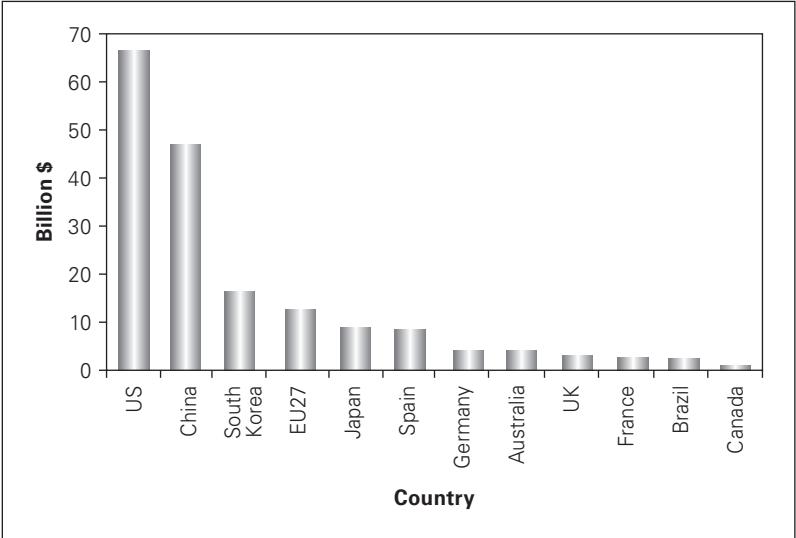
Godwell Nhamo and Senia Nhamo

Introduction

As the world battles with climate-change realities, another global battle, ushered in by the global financial and credit crises, emerged during the second half of 2007. For some time, the world has been focusing on addressing climate change through appropriate mitigation and adaptation measures. For a while, though, the global financial crisis diverted the attention away from the environmental crisis, as governments the world over remained perplexed by the events leading to the economic crisis.¹ Considerable effort has gone into research on how to fight the effects of the financial crisis and, most importantly, how to prevent its recurrence. With a myriad of policy recommendations emerging, authorities have to strategically select the best tools to cushion them against the ripple effects of both climate change and the financial crisis.²

Today, the worldwide focus is on how to transform economic, political and ideological orthodoxies. To some, the global economic crisis presents an opportunity for authorities to consider an alternative development path. One such path was suggested by the United Nations Environment Programme (UNEP) as a 'Global Green New Deal' in April 2009.³ This is viewed as a mechanism for the revival of the global economy and employment creation, while simultaneously accelerating the fight against climate change, environmental degradation and poverty. The Global Green New Deal comes 75 years after President Roosevelt launched a 'New Deal' to

Figure 3.1 Investment in clean energy



Source Data from World Economic Forum, 2010. *Green investing 2010: Policy mechanisms to bridge the financing gap*. Geneva: World Economic Forum, p.16

fight the capitalism crisis in America in the 1930s. In other words, it is an old initiative with new dimensions. An example of a green initiative from the 1930s New Deal was the construction of the Hoover Dam, which created tens of thousands of jobs and produced carbon-free energy for millions. Similarly, in the UK, the New Economics Foundation first proposed a programme called the ‘Green New Deal’ in 2000.

Key areas suggested by the UNEP for the Global Green New Deal include the greening of old and new buildings, a move towards renewable energy (wind, solar, geothermal and biomass), sustainable transport, bolstering the ecological infrastructure (fresh water, forests, soils and coral reefs) and achieving sustainable agriculture.⁴ At the Pittsburgh G20 Summit in September 2009, the Global Green New Deal update provided a summary of the green investments included in national financial stimulus packages for a selected group of nations. The summary also provided the rate at which green investments were disbursed and the progress in domestic policy reforms necessary for these investments as part of the long-term transition to a green economy. Investment in the green economy’s clean-energy sector between 2008 and April 2009 has been remarkable.⁵ The details are shown in Figure 3.1. The US was in the lead, with investments in clean energy to the value of \$66,6 billion.

This was followed by China (\$46,9 billion) and South Korea (\$16,4 billion). The three countries with the lowest investment were France (\$2,1 billion), Brazil (\$2,5 billion) and Canada (\$1 billion).

This chapter documents and assesses green economic stimulus packages as environmental financing and examines how governments and the corporate world in various countries are implementing these packages. The main questions raised are which stimulus packages have been put in place to address the global financial crisis and how are environmental concerns, especially those relating to climate change, being financed? Aligned to the main aim and research question are the following objectives: to document the nature and extent of green stimulus packages put in place to address the twin challenges of the global economic meltdown and environmental degradation; and to determine if there are possibilities for extending the green economic stimulus packages into a future economic development paradigm. In terms of data, standard comparisons from country to country were difficult to make because green-economic stimulus packages and financing vary both in terms of focus and duration. To overcome this problem, a case-study approach was applied that included certain elements of meta-analysis.

This chapter is organised into five parts. The first part considers the research design that articulates the aims, questions and objectives of the study. The second part deliberates on the global financial crisis (which includes tracing its origins and discussing its impacts). The third focuses on fiscal stimulus packages in general. The fourth part considers the green economic stimulus packages, examining their size and sector investments and how these packages, in effect, brought to life the green economy as a possible future hybrid development model. Before closing the arguments, the fifth part reviews issues surrounding the emerging future development model, which draws heavily from the green economy and green growth strategies that have been in place since 2008.

Global Financial Crisis: Origins and Key Impacts

In trying to explain the causes of the global financial crisis, a confluence of factors has been put forward. The catalyst of the crisis has been identified as the US subprime house mortgage market and the subsequent bursting of the consumer and asset bubbles of 2007. The crisis was then triggered by the reversal of prices accompanied by a tightening of monetary policy.⁶ When the bubbles finally burst, many assets were proved to be worthless and this led to the financial crisis in the US, which quickly

spread to other developed countries. The crisis then became global because risk-loving investors had bundled packages of loans and spread them across several countries. As a result, the world economy went into the worst recession since the Great Depression of the 1930s. The causes of the crisis can be attributed to the failure of regulation and monitoring in the banking system.

This chapter focuses on the environmental issues associated with the crisis. As a result of tight credit and lower prices, many countries experienced a slowing down and downward revision of a number of environmental projects, less expenditure on household efficiency measures and reduced expenditure on research and development in energy-efficient models and land-use patterns.⁷ Delays in the construction of effluent treatment plants also affected the water environment. Given these negative impacts of the financial crisis on the environment, it became clear that any attempt to address the financial crisis had to include addressing environmental issues. This relationship between the global financial crisis and the environment also suggests that the response to the crisis could, to some extent, address environmental issues. This, in turn, calls for an identification of clear-cut linkages.

Governments and central banks have responded to the global economic crisis in various substantive and innovative ways. Their main objectives include promoting the liquidity and solvency of the financial sector, the restoration of confidence in the financial sector and ensuring that they are cushioned against the fallout of the crisis on the real economy. Response mechanisms during the period of pandemonium and panic varied from country to country. Initial efforts in various countries included:⁸

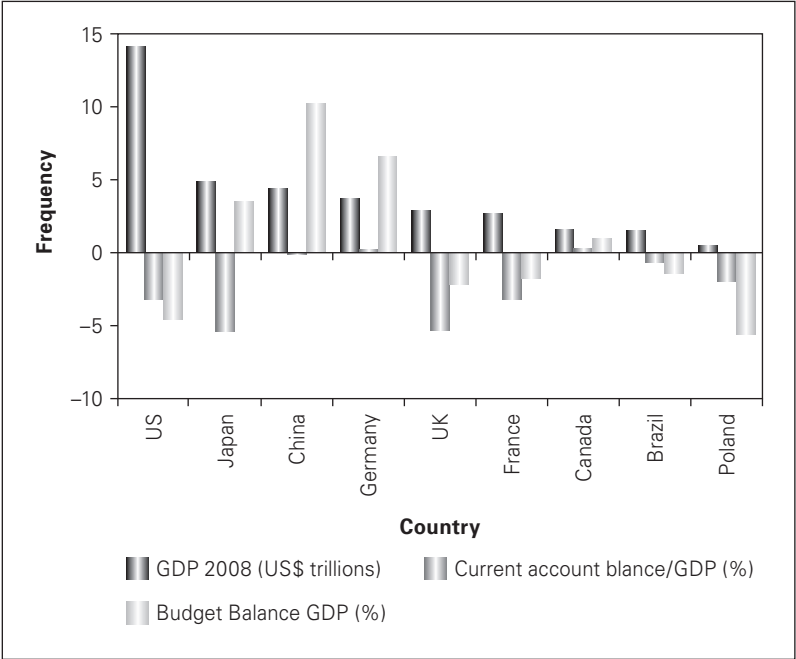
- the use of unconventional measures, such as quantitative easing and qualitative or credit easing, to reduce risk premia and provide liquidity to markets in difficulty,
- industrial bail-outs, such as the \$700 billion Trouble Asset Relief Program, and purchases or exchanges of non-performing or illiquid assets (US),
- support for short-term wholesale funding markets,
- guarantees of retail deposits and other liabilities,
- capital injections into banks,
- reduction of interest rates to unprecedented levels (i.e. near zero per cent interest rates) in order to offset the increase in private-sector risk premia and underpin aggregate demand, and
- in general, more accommodative fiscal and monetary policies.

The initial monetary-policy efforts to cushion the effects of the crisis appeared to be ineffective, given that the ripple effects of the economic crisis spread from one country to another. Indeed, the opportunities for monetary-policy measures became restricted owing to the limited scope for a further reduction in interest rates.⁹ Faced with the threat of a serious economic recession, anticipated to be greater than the Great Depression of the 1930s, a number of governments considered the possibility of using economic stimulus packages. Given the limited scope of the first line of defence (i.e. monetary policy), fiscal policy became the tool for rejuvenating economies.

Resorting to fiscal policy as a form of stabilisation was long ago suggested by John Maynard Keynes,¹⁰ who initiated the idea of the government being able to stimulate economic activity. Events surrounding the Great Depression convinced Keynes that government intervention could help reverse the fall in spending, loss of confidence and escalating unemployment. The debate surrounding the effectiveness of fiscal policy and the suitable policy mix has a long history in economics. Although there are numerous arguments against expansionary fiscal policy, the economic crisis has generated some form of agreement that fiscal policy can be used as a once-off emergency measure. Historically, control of economic policy was left to monetary policy. The argument was that fiscal stimulus packages should be administered in a manner that is 'timely (e.g. take effect over the next year or so), targeted (focused on activities that have relatively high economic multipliers) and temporal (expire when the slowdown is over)'.¹¹ The extent to which fiscal policy will be effective both in the short term and long term is the subject of a great deal of debate. For example, an optimal fiscal package should be large, lasting, diversified, contingent, collective and sustainable.

Current debate is focused on whether it is best to embark on austerity measures or to continue to rely on stimulus packages. Widening fiscal deficits have led to the consideration of exit from fiscal support and, especially, the rolling back of fiscal stimulus measures. The use of discretionary fiscal policy for stabilisation purposes is treated discouragingly in a large body of empirical literature.¹² The arguments are mainly based on the long implementation lags and low fiscal multipliers. Although the immediate benefits of these discretionary measures in times of economic crisis have been highlighted, a number of scholars have warned of the need for an exit strategy.¹³ This exit strategy is crucial in view of looming debt ratios in most countries. Since these stimulus measures are crisis-related, the strong economic rebound in

Figure 3.2 GDP, current account balances and budget balances (2008)



Source: Based on Worldwide stimulus packages, 2009. *The China Analyst*, May–July 2009, p.3

most countries would influence the unwinding of stimulus measures. Although it is true that fiscal stimulus encourages economic recovery, not every country has the resources to finance stimulus measures.

Fiscal Stimulus Packages

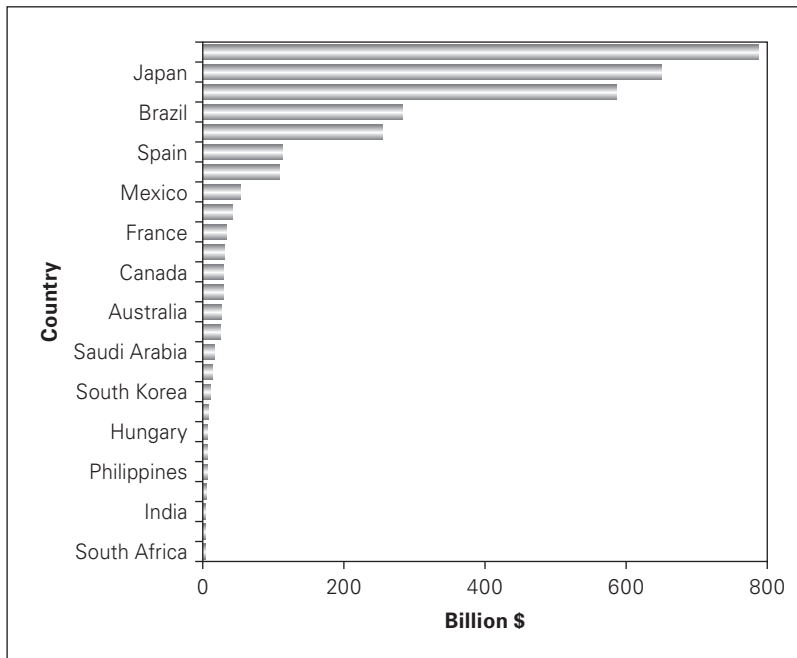
Economic stimulus packages have recently become popular as a means of stimulating the global economy following the financial crisis and were announced in 2008 and 2009 as the major part of government recovery plans. A number of countries embarked on discretionary fiscal stimulus packages. Curiosity mounted as to the nature of the scale, composition, timing and effectiveness of stimulus packages. The situation regarding gross domestic product (GDP), current account balances and budget balances of GDP for selected major economies in 2008 is presented in Figure 3.2.

From Figure 3.2, it emerges that US GDP was the highest at \$14,3 trillion, followed by Japan (\$4,9 trillion), China (\$4,4 trillion) and Germany

(\$3,7 trillion). At the lower end were Poland (\$0,5 trillion), Brazil (\$1,5 trillion) and Canada (\$1,6 trillion). In terms of the current account balance, Japan had the highest deficit (–5,4 per cent), followed by the UK (–5,3 per cent) and the US and France (both with –3,2 per cent). Only Canada and China had positive figures (0,3 per cent and 0,2 per cent respectively). The budget balance also revealed diverging scenarios. The US had a budget balance of –4,6 per cent, and the UK –2,2 per cent. China had the strongest budget balance at 10,2 per cent, followed by Germany with 6,6 per cent and Japan with 3,5 per cent.

The stimulus packages incorporated green-financing elements and initiatives that would mainly address climate change. An overview of the global stimulus packages is shown in Figure 3.3. The US had the largest stimulus, with \$787 billion allocated as of May 2009.¹⁴ This was followed by Japan (\$650 billion), China (\$586 billion), Brazil (\$283 billion) and Spain (\$113 billion). The EU's total came to \$255 billion; after Spain came Germany with \$109 billion, Poland (\$31 billion) and the UK (\$30 billion). The lowest amount was recorded in South Africa (\$3,7 billion).

Figure 3.3 Overview of green stimulus packages (2009)



Source: Based on Worldwide stimulus packages, 2009. *The China Analyst*, May–July 2009, p.3

Table 3.1 Breakdown of US and Chinese stimulus packages (to May 2009)

US (\$787 billion)	% of total stimulus	China (\$586 billion)	% of total stimulus
Tax relief	38	Infrastructure	43
State and local fiscal relief	18	Disaster reconstruction	24
Infrastructure and science	14	Rural construction	9
Protecting the vulnerable	10	Environmental protection	9
Healthcare	7	Social welfare	7
Education and training	7	Technological innovation	4
Energy	5	Value-added tax cuts	3
Other	1	Education and healthcare	1

Source Based on Worldwide stimulus packages, 2009. *The China Analyst*, May–July 2009

Other countries in the lower tier were Chile and India (both with \$4 billion), New Zealand (\$5 billion) and the Philippines (\$6,1 billion).

With no clear-cut formula for implementing the green stimulus packages, putting them into effect has proved to be a trial-and-error experience and, in some cases, has taken a long time. According to Hemming et al.,¹⁵ the appropriate fiscal stance depends on a number of factors and will vary from country to country. Important factors to consider include the source of the downturn, the response of interest rates and exchange rates, related economic policies, debt sustainability and the composition of the fiscal impulse, and influences on the behaviour of individuals. To ensure the effectiveness of stimulus packages, many countries have sought timely, targeted and temporal measures. Some of the measures taken include, firstly, revenue measures (e.g. cuts in personal income tax, corporate income tax and indirect taxes, such as value added tax (VAT), lower road tolls and fuel subsidies) and, secondly, expenditure measures, which include increased spending for infrastructure aimed at job creation, including green transportation networks, transfers to states or local governments, support for housing sectors, aid and/or loans to small and medium-sized enterprises (SMEs), financial assistance, credit guarantees and business development services, as well as labour market measures (e.g. job training, job sharing, expansion of unemployment benefits and social assistance schemes). A detailed analysis of the US and Chinese stimulus packages up to May 2009 and how these

addressed the issues highlighted is shown in Table 3.1. Out of the US packages of \$787 billion, the largest share (38 per cent) was allocated to tax relief, with state and local fiscal relief taking up 18 per cent. In China, 43 per cent of the \$586 billion of packages went to infrastructure, followed by 24 per cent allocated to post-disaster reconstruction.

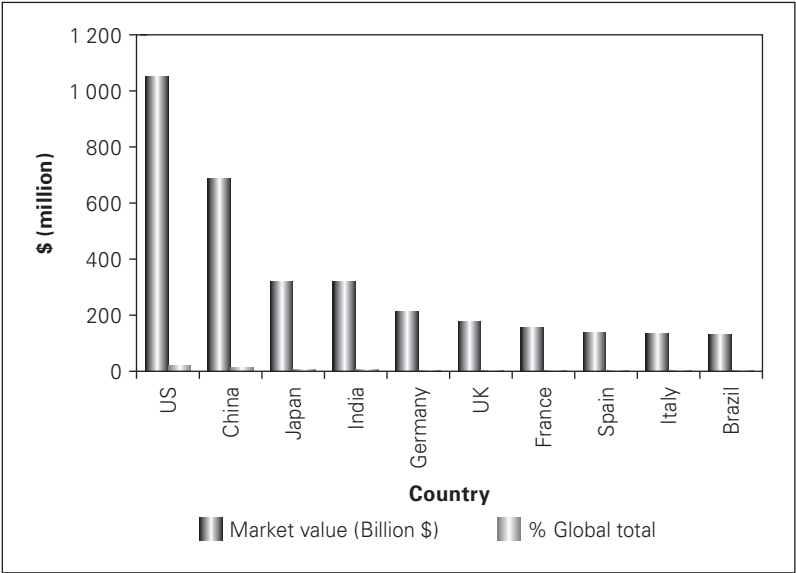
Green Economic Stimulus Packages

Most governments have integrated environmental concerns into stimulus packages by committing to a substantial green element in their fiscal recovery plans. This is a worthwhile exercise, bearing in mind the interconnectedness of the economic crisis and environmental issues. Although green stimulus elements are included in stimulus packages, the green programmes themselves may not address the immediate needs of jump-starting the economies. This is mainly due to the long-term nature of environmental projects, which do not immediately influence demand and which have a long implementation lag. In this section the authors trace these initiatives and examine the ‘green elements’ of fiscal stimulus packages that have been implemented. These packages have, in effect, given birth to what is now popularly known as the green economy.¹⁶ The value of the green economy is said to be huge.¹⁷ It is estimated at \$5,2 trillion and despite the global financial crisis, the global market for environmental goods and services recorded a 4 per cent growth in 2008 and continued to grow in 2009. The US and China, the largest emitters of greenhouse gases, correspondingly have the largest global green economy markets. A summary of the market value and global percentages of the top ten economies¹⁸ for 2009 is shown in Figure 3.4.

The US led the pack in 2009 in terms of market value, which was estimated at \$1,05 billion (20,61 per cent of global share). The US was followed by China, with an estimated market value of \$686 million (13,47 per cent of global share). In third place was Japan, with \$319 million (6,26 per cent of global share), followed by India with an estimated same amount as Japan (6,25 per cent of global share). Germany was ranked fifth, with \$214 million (4,18 per cent of global share). Brazil came in tenth position, with \$131 million (2,61 per cent of global total). Iran completed the top 20 list, with an estimated \$45 million (0,89 per cent of global share).

Strand and Toman¹⁹ provide a good working definition of what a green stimulus economy is. In their view, ‘a green stimulus is the application of policies and measures to stimulate short-run economic activity

Figure 3.4 Market value of ten largest green economies (2009)



Source: Adapted from Globe Foundation, 2010. *British Columbia's green economy: Building a low-carbon future*. Vancouver: Globe Foundation, p.7

while, at the same time, preserving, protecting and enhancing environmental and natural resource quality both near-term and longer-term'. Such a definition is broad and relates to outcomes, as opposed to the instruments that are used to achieve the desired outcomes. The focus is, therefore, on measures aimed at increasing short-run economic activity that have long-term environmental benefits and positive impacts.

By July 2009 an estimated \$3 trillion had been spent globally on stimulus packages, of which 15 per cent of this amount (\$463 billion) was channelled towards green investments. The green stimulus investments for the G20 amounted to 0,7 per cent of their combined GDP. Table 3.2 gives a summary of 'green' credentials from stimulus packages in the G20 countries. Only Brazil, Russia and Turkey did not have their data recorded. The phased implementation periods are shown. There is considerable variation in the size and composition of the stimulus packages and the length of their operation. South Korea stands out as the country that dedicated the largest percentage of its stimulus package to green initiatives – 80,5 per cent.²⁰ This was followed by the EU with 58,7 per cent of the total stimulus package being green, and China with 34,3 per cent. In 2009, only 11,5 per cent of the US stimulus package was

Table 3.2 Green fiscal measures in selected G20 countries (2008)

Country	Total stimulus (\$ billions)	Green fund total (\$ billions)	Fund as % of GDP	Green fund as % of stimulus	Green fund as % of GDP	Period
Argentina	3,7	0,0	1,1	0,0	0,0	2009
Australia	26,7	2,5	2,5	9,3	0,2	2009–2012
Canada	31,8	2,6	2,0	8,3	0,2	2009–2013
China	586,1	200,8	13,9	34,3	4,8	2009–2010
France	33,7	7,1	1,1	21,2	0,2	2009–2010
Germany	104,8	13,8	2,7	13,2	0,4	2009–2010
India	13,7	0,0	1,1	0,0	0,0	2009
Indonesia	5,9	0,1	1,2	1,6	0,0	2009
Italy	103,5	1,3	4,3	1,3	0,1	2009+
Japan	485,0	12,4	10,0	2,6	0,3	2009+
Mexico	7,7	0,8	0,7	9,7	0,1	2009
Saudi Arabia	126,8	9,5	24,0	7,5	1,6	2009
South Korea	38,1	30,7	4,0	80,5	3,2	2009–2012
UK	30,4	2,1	1,1	6,9	0,1	2009–2012
US	972,0	112,2	6,8	11,5	0,8	10 years
EU	38,8	22,8	0,2	58,7	0,1	2009–2012

green. This probably explains why China is ahead of the US in terms of green initiatives.²¹

Green measures took various forms in different countries. Our remarks are based on the green measures adopted in several Asian countries – China, Japan, South Korea, Singapore, Malaysia, Thailand, Indonesia, the Philippines and Vietnam. We shall also consider green measures in the US and Germany. In Japan the green stimulus was estimated at 16,4 per cent of GDP.²² Measures included support for transition to low-carbon revolution, tax measures to encourage green investment and the purchase of green products, eco-point systems to reward consumers when purchasing energy-saving appliances and financial

support via the local green new deals. In Indonesia the green measures, which were estimated at 1,2 per cent of GDP, included tax breaks for individuals and companies, infrastructure spending, diesel subsidies and rural development. In South Korea, green measures accounted for 12,8 per cent of GDP,²³ and included investments in green transport (especially rail), the purchase of green cars, investment in alternative water sources, waste recycling, eco-towns, improving forests as carbon sinks and replacing public-sector lighting with LEDs. Green measures accounted for 10 per cent of Malaysia's GDP, and initiatives included the rehabilitation of public amenities, housing and transport, and skills training. Singapore concentrated on the job credit programme, corporate tax cuts and personal income tax cuts. Green measures were estimated at 10,7 per cent of GDP.

Thailand's green measures witnessed the introduction of the sufficient economy fund and infrastructure projects on energy, transport and communications. These initiatives accounted for about 1,2 per cent of GDP. Green measures taken in the Philippines were also significant (4,6 per cent of GDP) and focused mainly on job creation, tax reduction and infrastructure projects. In Vietnam, green measures accounted for a significant portion of GDP (22 per cent). These measures included subsidies and loans to SMEs, infrastructure projects, social security and special initiatives to support the export sector. In Germany, the green measures came in two phases. The first phase focused on infrastructure, tax relief, support for SMEs and education. During the second phase, the focus was on aid to the automotive industry and tax relief for households.²⁴ Of the countries considered here, Vietnam had the largest percentage of green measures relative to a country's GDP. China's green stimulus component focused mainly on rail, grid, water and waste. This is in sharp contrast to the US's major actions in the areas of renewable energy and improving energy efficiency. The US also invested in carbon capture and storage.²⁵

Further details regarding the sums allocated to specific green initiatives from selected G20 countries are shown in Table 3.3.

Green stimulus components provide a good indication of where government policy direction is headed as far as climate change priorities are concerned. The main focus of green stimulus packages (measures) has been rail, grids, energy efficiency and renewables.²⁶ There are real benefits associated with the incorporation of green issues into the fiscal stimulus packages. Some of the advantages are an immediate increase in employment in the short term, tackling fuel problems, meeting

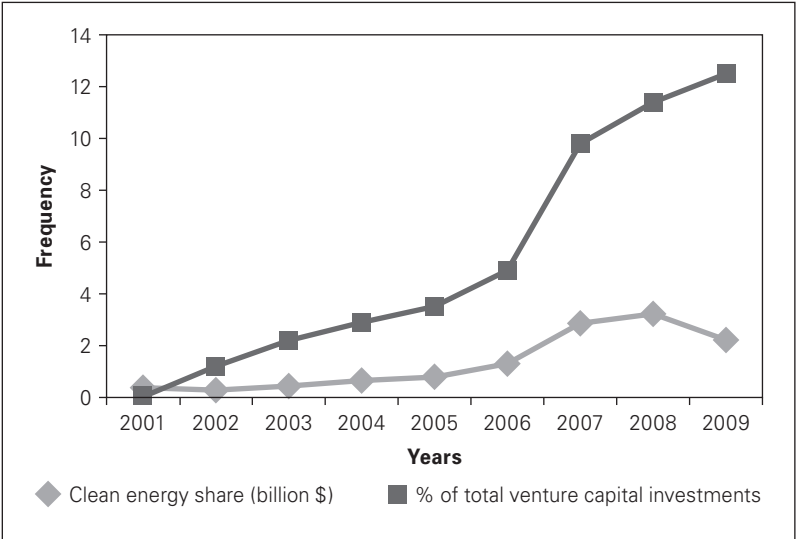
Table 3.3 Green initiative spends (\$ billions) in selected sectors (2008)

Country	Renewable energy	Carbon capture	Energy efficiency	Low-carbon vehicles	Rail	Grid	Water/waste
Canada	-	1,1	0,2	-	0,4	0,8	0,1
China	-	-	-	1,5	98,7	70,0	30,7
France	0,9	-	0,8	-	1,3	4,1	-
Germany	-	-	10,4	0,7	2,8	-	-
South Korea	1,8	-	6,2	1,8	7,0	-	13,9
UK	-	-	0,3	1,4	0,4	-	-
US	32,8	6,6	30,7	4,8	9,9	11,9	15,6
EU	0,6	12,5	2,8	1,9	-	4,9	-

housing-policy objectives and the reduction of carbon emissions. At the 2009 World Bank/IMF annual meetings in Istanbul, the issue of green investments as part of economic stimulus packages was central. A high-level panel analysed the idea under the heading ‘Greening recovery, seizing opportunities’. The triple benefits of green investments were identified as being that, firstly, the right investments can simultaneously create jobs today; secondly, they lay the foundations for growth tomorrow; and, thirdly, they fight environmental degradation and climate change.

Private-sector involvement in green development and growth in the US has a longer history. Investment in the clean-energy sector has been on an upward trend since 2001.²⁷ US venture capital investments in the clean-energy sector rose from \$351 million in 2001 (0,09 per cent of total venture capital investment then) to \$3,2 billion in 2008 (11,4 per cent of total venture capital investment) before slowing down to a significant \$2,2 billion in 2009 during the peak of the global financial crisis. The 2009 investment amounted to 12,5 per cent of total venture capital investment, a percentage that was higher than any other since 2001.²⁸ Figure 3.5 shows the trends in private-sector clean-energy venture capital investment in the US from 2001 to 2009. The percentage of clean-energy venture capital investments rose from an insignificant 0,09 per cent in 2001 to 3,5 per cent in 2005 before sharply rising to 9,8 per cent in 2007, 11,4 per cent in

Figure 3.5 Clean-energy venture capital investments in the US (2001–2009)



Source: Adapted from Department of Research and Development, 2010. *Island of Hawaii green economy report*. Hawaii: Department of Research and Development, p.11

2008 and, finally, 12,5 per cent in 2009. The corresponding total venture capital investment figures for the periods whose percentages have been analysed here were \$40,6 billion (2001); \$23 billion (2005); \$29,4 billion (2007); \$28,3 billion (2008) and \$17,7 billion (2009).

Emerging Future Development Model

Pre-crisis growth models seem to be losing favour owing both to their reliance on the intensive use of resources and the negative impact of the global financial crisis. A new concept of ‘green growth’ has emerged in the aftermath of the crisis. Although it has no clear-cut definition, green growth complements sustainable development and emphasises ‘green’ job creation.²⁹ While the focus has largely been on environmentally conscious growth and development that preserves the environment, biodiversity and natural resources, green growth also highlights the importance of the realisation, by policymakers, that the environment is a source of future economic growth.³⁰ Faced with economic and environmental challenges, these two can no longer be treated in isolation. According to Girouard,³¹ environmental issues need to be integrated into economic policy instead of being treated as an afterthought.

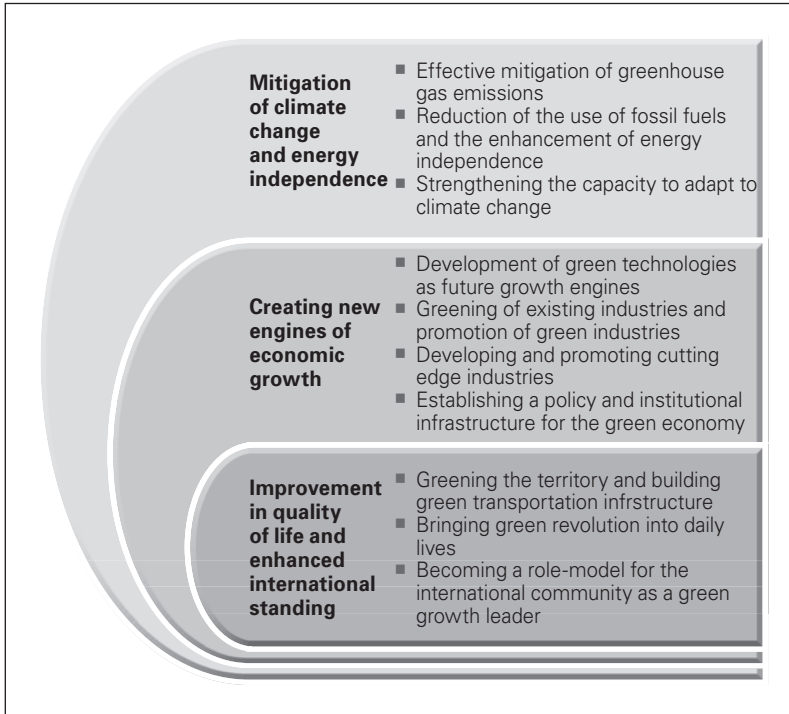
Stimulus packages have strengthened the foundation for a new green economic growth path. It is anticipated that green investments will continue to be regarded as a strong development paradigm. At the European Sustainable Development Network conference in July 2010, the Organization for Economic Cooperation and Development (OECD) countries attempted to map a green growth strategy.

The major challenges to be addressed as the world searches for a new development model include biodiversity and ecosystems services, sustainable use of resources, sustainable materials management and climate change.³² These challenges all relate to a hybrid economic development path that aims to address these challenges. Although the OECD³³ acknowledges that the green stimulus packages and other extraordinary monetary and financial measures have played a major role in addressing the short-term economic crisis and established solid measures that will facilitate green growth, these packages cannot be regarded as long-term solutions. This is because there is growing concern about increasing public budget deficits. In addition, long-term economic recovery cannot be sustained through continued subsidies for job creation or green initiatives alone. To this end, the OECD proposes that governments develop a 'transparent and credible process for withdrawing extraordinary fiscal, monetary and financial sector support'.³⁴ Although the OECD proposes a return to sustainable enterprise and job creation that are accompanied by private-sector investment, this is not in line with what the authors believe the new development model should look like. Market forces and free regulatory regimes were the chief causes of the global financial meltdown and one cannot entrust the free market economy to deliver an equitable development agenda in the future.

The green-economy movement should, therefore, facilitate the future transition to a new development model that draws from the failure of economic development and a weak sustainable development model. This implies significant structural shifts that are accompanied by innovative thinking and 'hard decisions'. These decisions are required to change the manner in which we look at life. Life is not about overconsumption, luxurious living, and neglecting the have-nots and future generations. The current, dominant economic growth models should be challenged and new textbooks written.

The South Korean Five-Year Green Growth Plan spells out a vision that reflects a good example of a shift in the country's growth paradigm from quantitative growth to qualitative growth. The basis of this vision is the long-term strategy of economic greening up to 2050. This

Figure 3.6 Objectives and policy directions in South Korea's Green Growth Plan

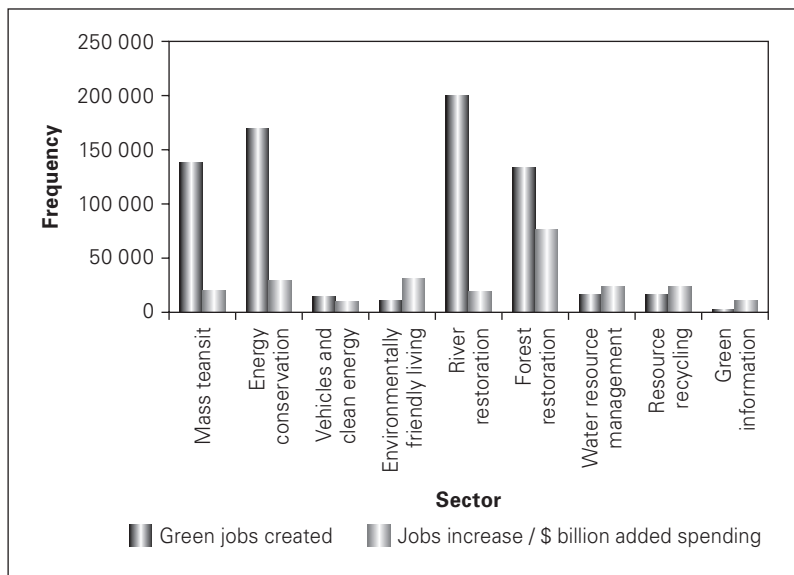


will be implemented through five-year plans for green growth. The key elements of the qualitative growth paradigm are new ideas, transformational innovations and state-of-the-art technology. It is believed that these will create intensive qualitative production, as opposed to extensive quantitative production.³⁵ The first Five-Year Green Growth Plan covered the years 2009 to 2014. A summary of its objectives and their sub-objectives is shown in Figure 3.6.

The principal initiatives of South Korea's green new deal include funding the revitalisation of four major river catchments (an activity that was expected to generate 200 jobs per 1 000 population and absorb 28,7 per cent of total funds); eco-friendly transport networks (that will absorb a share of 19,2 per cent of total funding); national green information infrastructure; water facilities and management; and clean cars and energy.³⁶ Other initiatives looked at recycling, forest restoration, energy conservation (16 per cent of total funding) and environmentally friendly living space.

In its New Growth Path of 2010, the South African government distinguishes between the old and new economies. The new economy is made up of the green, social and knowledge sectors, whereas the old economy is made up of the agricultural and mining value chains, manufacturing, tourism and high-level services.³⁷ The New Growth Path also conceptualises the developmental state, which is state-led, but which articulates well with market institutions. Such a developmental state must support transformation towards a more equitable, decent, work-generating and green economy. President Zuma highlighted some key elements of the kind of growth model envisaged for the future: one that creates a significant number of what he called ‘decent jobs’, and which includes a modern infrastructure and a vibrant economy, and offers the people of South Africa a high quality of life.³⁸ Such a development model is one that ‘will be neither easy nor uncontested’, since it will require hard work and difficult choices now and in the future.³⁹ The question of job potential that the South African government wishes to see addressed in its future development path becomes clearer when we consider projections from South Korea (see Figure 3.7).

Figure 3.7 Effects of green spending in South Korea on the creation of green jobs



Source: Adapted from Strand, J. & Toman, M., 2010. *Green stimulus, economic recovery and long-term sustainable development*. Washington, DC: World Bank, p.19

Figure 3.7 shows that the highest number of green jobs created from South Korea's green stimulus was in river restoration. Out of the nine sectors prioritised, river restoration was expected to create 200 000 jobs. The next sector with job-creation potential was energy conservation (170 000 jobs), followed by mass transit (138 000 jobs) and forest restoration (134 000 jobs). In terms of jobs created per billion US dollars added in expenditure, the forest-restoration sector could contribute the highest, with an estimated 76 600 jobs. This was followed by the environmentally friendly living-space sector (30 900 jobs) and energy conservation (29 100 jobs). Overall, an estimated 703 000 jobs were expected from the green stimulus growth trajectory, and 24 600 jobs per billion dollars additional expenditure across the sectors.

Economic stimulus packages have, in effect, the task of bailing out yesterday's economy and, at the same time, investing in scaling up and facilitating tomorrow's economy. While economic stimulus packages are short term by nature, the authors believe that there will be long-term economic and environmental benefits arising from the projects borne by the stimulus packages. The global economic stimulus packages have set a road map for low-carbon, green-growth pathways. What is needed is a commitment that goes beyond the stimulus packages. A few policy proposals can be observed that will result in a movement towards the new development model we envisage. These include:⁴⁰

- putting a price on pollution/depletion of natural resources,
- cooperation on green tax policies between the government and companies/tradable permit systems,
- improving innovation/public funding for research and development,
- cutting subsidies for fossil fuel use,
- job creation policies,
- cooperation across borders, but tailoring specific policies for individual country needs, and
- green growth and development to go hand in hand for developing economies.

A commitment to such policies will help maintain the political enthusiasm for green growth. Life after stimulus packages should be characterised by a continuation of policy direction towards achieving green growth. This is because, beyond the stimulus, new programmes will be implemented, with new budgets designed to boost a low-carbon

economy. Synergistic green growth cooperation mechanisms between countries to achieve green economies should be encouraged.

Conclusion

Environmental financing through green global stimulus packages emerged out of a necessity to jump-start economic growth following the global economic crisis of 2008. Green stimulus packages were part of the bigger economic stimulus package, and key industries that benefited from the green stimulus were in the energy sector, especially in the renewable-energy and energy-efficiency sectors. Other sectors that witnessed significant investments were transport and smart grids. As the world grapples with questions relating to the sustainability of economic stimulus packages in general, and green stimulus packages in particular, the issue of ballooning fiscal deficits has emerged. As a result, there are now strong calls to exercise fiscal discipline and find sustainable ways and a new development model that takes us into the future. From the authors' perspective, the green growth development model must be one that draws significantly from a balanced growth model. The authors agree that both the economic- and sustainable-development paradigms have neglected the notion of balance. Green growth, green economy, green recovery or green development may, therefore, be a step in the right direction as we try to secure the future and debate a new development model. History has taught us that where there is a political will there are resources and there is a way. The stimulus packages showed this. The global economic melt-down brought urgency, and global leaders acted in unison to address both the economic and environmental crises. In the process, climate change became the key driver to the green global stimulus packages.

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Carbon benchmarking and accounting

Godwell Nhamo and Ashley Mutezo

Introduction

Writing on the subject of international carbon accounting and drawing lessons for Africa is highly relevant today, given that levels of awareness in this field have risen. This is an area supported by the United Nations Framework Convention on Climate Change's (UNFCCC) 17th Session of the Conference of Parties (COP17), hosted in Durban in November/December 2011. Issues pertaining to the measurement, reporting and verification (MRV) of greenhouse gas (GHG) emissions have dominated global climate negotiations in recent times, especially since the Copenhagen debacle of 2009.¹ When one thinks of carbon benchmarking and accounting, terms such as 'carbon asset' (sinks) and 'liability' (carbon source) come to mind. Consumers now expect corporates and governments to account for their carbon footprint and to 'do something' about it. In addition, there has been an increase in carbon regulatory frameworks at all levels (global, continental, subcontinental, national, state/provincial and local), and Africa is no exception to this. Climate change has become a key agenda in international trade negotiations, with direct emphasis on reducing the concentration of GHGs in the atmosphere. The first step towards achieving this is quantifying GHG emissions at organisational and national levels. GHG accounting standards have, therefore, been put in place to provide an international, policy-neutral set of tools to be adopted and used for consistency in undertaking and certifying GHG inventories and projects.

The use of the terms ‘carbon accounting’ and ‘environmental (green) accounting’ might be misunderstood if not put into proper perspective. According to the Environmental Protection Agency (EPA),² one can talk of carbon and/or environmental accounting at the global, national, financial (i.e. corporate) and management (i.e. firm, division, facility, product, line or system) levels. Since the main aim of this chapter is awareness raising, with specific reference to carbon accounting, an effort will be made to stay away from the discipline of environmental accounting. Carbon accounting is a growing discipline that draws heavily from environmental science (especially climate change science and policy), accounting and law. It also borrows concepts from other related disciplines, such as forestry, economics, international law and international relations. One climate change mitigation area that has witnessed a great deal of contestation regarding carbon accounting, particularly in the area of MRV, has been reducing emissions from deforestation and forest degradation plus (REDD+).³

The first decade of the twenty-first century has witnessed a proliferation of carbon-accounting standards, protocols and guidelines as the world battles with the need to significantly reduce anthropogenic GHG emissions. Among such standards and protocols are ISO 14064, which deals with GHG accounting and verification;⁴ the GHG Protocol for Corporate Accounting and Reporting Standards (GHG Protocol);⁵ the GHG Emissions and Life Cycle Analysis and/or the PAS 2050 Life Cycle Analysis Guidelines;⁶ the South African Fruit and Wine Industry Carbon Calculator; and the Carbon Protocol of South Africa. The National Climate Change Response Green Paper for South Africa, which was available for public comment at the time of writing,⁷ proposes to have an internationally recognised draft MRV system in place by 2012. This means that mandatory carbon accounting is inevitable.

The aim of this chapter is to raise awareness of international and African carbon-accounting protocols, standards and guidelines and to provide insights for future policy. The chapter seeks to address the question of which international carbon accounting protocols, guidelines and standards are commonly used and how applicable they are to the African context. Linked to these aims are the following research objectives: to present and discuss commonly used international carbon-accounting protocols, standards and guidelines; to determine the extent to which such international carbon-accounting protocols, standards and guidelines have been domesticated for use in Africa, especially South Africa; and to come up with policy recommendations on how the African

corporate world should utilise such international carbon-accounting protocols, standards and guidelines. The chapter draws heavily from a literature survey and leaves room for primary research work in the future.

This chapter has six main parts. The next section discusses carbon-accounting currency and the global carbon market. The following section deals with the fundamentals of carbon accounting, and another focuses on international perspectives in carbon accounting. The carbon-accounting initiatives in South Africa are also examined in the fifth section. The sixth section is dedicated to addressing the future of carbon accounting in Africa, with a particular focus on South Africa. The South African synopsis is informed by the fact that it is the most developed country in Africa and needs to significantly reduce its carbon emissions given its carbon footprint.

Carbon-Accounting Currency

In conventional financial and management accounting, money is the reference point in the balance sheet. In carbon accounting, however, the ‘currency’ used is carbon. All GHGs are converted to a common denominator equivalent to carbon dioxide (denoted as carbon dioxide equivalence – CO₂e) and measured to the nearest tonne. An increasing number of companies and a few countries are moving towards carbon neutrality, an issue that requires carbon accounting. Carbon neutrality is achieved when an entity puts in place internal measures to reduce its emissions through initiatives like energy efficiency, the use of renewable energy, the construction of green buildings and offsetting carbon that cannot be reduced internally. In addition, at the global level both the regulated and voluntary carbon markets demand that the unit of measurement to facilitate carbon trade (one tonne of CO₂e) measured, for example, in Africa, be exactly the same as one tonne of CO₂e measured anywhere else on the planet.⁸ The global carbon market is mainly the result of the regulatory mechanisms under the UNFCCC’s Kyoto Protocol discussed in Chapter 1. In addition to the regulatory Kyoto Protocol, there is the voluntary carbon market, which currently takes up a very small share of the total global carbon market (i.e. not more than 20 per cent).

Fundamentals in Accounting

There is a link between traditional accounting and the fast-growing discipline of carbon accounting. This is why it is important that readers

interested in carbon accounting are familiar with the fundamentals of accounting. Accounting can be defined as the systematic recording, reporting and analysis of financial transactions of an organisation. It is a system of measuring, interpreting and reporting the information from bookkeeping so that shareholders, managers and other interested parties can make sound financial decisions. The information is communicated through the preparation and distribution of accounting reports, the most common of which are known as financial statements.

The users of financial information include present and potential investors, lenders, suppliers and other trade creditors, employees, customers, governments and their agencies, management and the public in general. The identified stakeholders use financial statements in order to satisfy their different information requirements. Users of financial information can be divided into two categories: internal and external users. This also applies to carbon accounting. Two fields of accounting have developed as a result of this distinction between key users: financial accounting (concerned with the provision of financial information mainly to external parties) and management accounting (concerned with the provision of financial information to people within the organisation).

Objectivity is important in accounting, and in order to achieve this specific rules have been established to govern the way in which business activities are recorded. Rules or guidelines are enforced by accounting standards, such as the International Accounting Standards (IAS)⁹ and the International Financial Reporting Standards (IFRS). Together, these guidelines are contained and governed under an umbrella authority – Generally Accepted Accounting Practice (GAAP). In the case of carbon accounting, rules and guidelines are enforced by standards such as the GHG Protocol. The IAS are guidelines, rules or principles that direct the way in which organisations record transactions and prepare financial statements. These standards are accepted, adopted and used by countries all over the world, including South Africa. Before the IAS, each country had its own set of rules and standards that governed how entities in that country prepared their accounts. However, this state of affairs was both confusing and difficult to negotiate, particularly when consolidating the financial activities of multinational organisations. It meant that company accountants needed to be familiar with the rules that applied in a number of countries. It could also present a problem for investors, since the accounts for one country might not be understood by investors from other countries.

The techniques used in the practice of accounting are based on conceptual and theoretical ideas generally known as accounting principles. Transactions of a repetitive nature frequently occur in accounting, and the requirement of consistency means that an entity has to establish an accounting policy that determines how such transactions will be treated. Accounting policy is, therefore, a set of decisions about how the entity will treat the same type of transactions in order to achieve a consistent result. A business entity has to disclose its accounting policy in its financial statements (e.g. by indicating the basis used to deal with the depreciation of property, plant and equipment). A foundation has been developed over the years for the measurement and disclosure of the results of financial events (transactions). This foundation is known as the 'framework'.

The framework sets out the objectives and concepts that underlie the preparation and presentation of all financial statements. The framework serves as a foundation and constitution for accounting; in other words, it is a coherent system of mutually dependent objectives and fundamental principles that help create consistent standards and prescribe the nature, function and limitations of financial accounting and financial reports. The framework is, therefore, considered and applied in the recording of all accounting transactions, as well as in the preparation and presentation of all financial statements. In addition, the framework is used to solve all accounting problems (mainly recognition and classification). Certain accounting problems, however, require more detailed attention; this has led to the development and publication of a series of additional Standards on Generally Accepted Accounting Practice.

There are twin fundamental accounting concepts that were developed centuries ago and still remain central to the accounting process. These fundamentals are the accounting equation and the double-entry system. The accounting equation is represented as: $\text{Assets} = \text{liabilities} + \text{owner's equity}$. This equation forms the basis of all accounting transactions and is, therefore, the starting point for an understanding of accounting principles. The double-entry principle is based on the fact that every transaction influences two or more items, meaning that every transaction has a dual effect on the basic accounting equation (BAE) and that, after every transaction, the BAE must remain in balance. In a double-entry accounting system, every transaction is recorded in the form of a debit and a credit, even for the simplest double entry. In simpler terms, a debit is the application of money, and a credit is the source of money. This concept explains the double-entry system of recording

transactions (i.e. for every debit entry there must be a corresponding credit entry). Likewise, carbon accounting deals with sources and sinks of emissions.

For information included in the financial statements to be useful, qualitative attributes should be included. Such attributes include four principles: understandability, relevance, reliability and comparability.¹⁰ The 'accounting framework' sets out the concepts that underlie the preparation and presentation of financial statements for external users of financial statements.

Carbon Accounting: Focus on International Frameworks

A number of international frameworks have been put in place that have both a direct and indirect bearing on carbon accounting. These include both regulatory and voluntary frameworks. Some of these frameworks are the GHG Protocol, ISO 14064, Publicly Available Specifications (PAS) 2050: 2008, the International Wine Carbon Calculator Protocol and the Intergovernmental Panel on Climate Change (IPCC) GHG Guidelines. These and other frameworks are considered in detail in the following sections.

The Greenhouse Gas Protocol

In 1998, the World Business Council for Sustainable Development (WBCSD) launched the GHG Protocol initiative jointly with the World Resources Institute (WRI).¹¹ The GHG Protocol aims to harmonise GHG accounting and reporting standards internationally to ensure that different trading schemes and other climate-related initiatives adopt consistent approaches to GHG accounting. The GHG Protocol is the most widely used international accounting tool for companies, government agencies and business and environmental groups around the world, and was designed in order to help understand, quantify and manage GHG emissions.¹² The protocol is a step-by-step guide to building a new generation of credible and effective programmes for tackling climate change.¹³

The GHG Protocol addresses the accounting and reporting of the six GHGs covered by the Kyoto Protocol.¹⁴ Unlike financial accounting and reporting, there are no generally accepted accounting and reporting practices for corporate GHG emissions. The GHG Protocol: Corporate Accounting and Reporting Standard is intended to be the

GHG equivalent of Generally Accepted Accounting Practices for financial reporting.¹⁵ The protocol is, therefore, a significant milestone on the journey towards generally accepted GHG accounting and reporting practices. The GHG Protocol provides scopes for dividing up emissions into different categories, as follows:

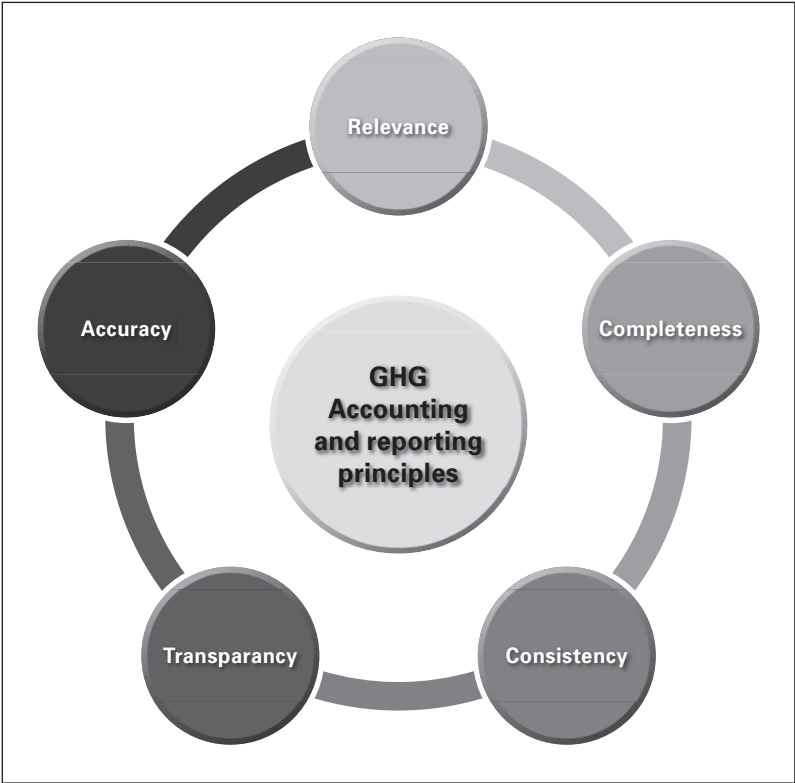
- Scope 1: Direct emissions from sources controlled by the company
- Scope 2: Indirect emissions from purchased electricity
- Scope 3: Indirect emissions (such as transportation or extraction of purchased materials)

The GHG Protocol also provides a conceptual framework for determining which emissions to include or exclude in the accounting process (known as equity versus control boundaries). Like management accounting, this is an important issue for accounting at the corporate level. The GHG Protocol was, therefore, developed in order to improve the consistency and credibility of inventories, simplify measurement and reporting, minimise the cost of developing inventories and establish common building blocks for GHG markets.¹⁶

Business and other stakeholders alike benefit from agreeing on a common standard of accounting for GHG emissions. For businesses, it reduces costs if their GHG inventory is capable of meeting different internal and external information requirements. For others, it improves the consistency, transparency, and clarity of reported information, thus making it easier to track and compare progress over time. As with financial accounting and reporting, the GHG Protocol is governed by five principles (see Figure 4.1). These generally accepted GHG accounting principles are intended to strengthen and guide GHG accounting and reporting. This ensures that the reported information represents a faithful, true and fair account of a company's GHG emissions.

The principle of relevance is important in providing information that is of use to stakeholders (both internal and external to the organisation). The completeness of the GHG report is measured by how comprehensive and meaningful the compiled information is, including all relevant emission sources from the chosen inventory boundary. Consistency in the organisation's reporting of GHG emissions allows one to track emissions over time in order to identify trends. Transparency makes possible a clear audit trail of the information presented. To ensure transparency, the processes and procedures of collecting and calculating the data should be clearly documented within the report. The data collected

Figure 4.1 GHG accounting and reporting principles



Source Adapted from WBCSD and WRI, 2004. *The Greenhouse Gas Protocol: A corporate accounting and reporting standard (revised edition)*. Washington, DC: World Business Council for Sustainable Development and World Resources Institute

should be accurate and precise for an organisation’s report to be credible. The use of standard and systematic measurements, estimates and calculations helps ensure data accuracy.¹⁷

The GHG Protocol provides the accounting framework for nearly every GHG standard and programme in the world, such as the International Organization for Standardization, the EU Emissions Trading Scheme, the California Climate Registry and hundreds of GHG inventories prepared by individual companies. The use of the GHG Protocol by organisations enables them to participate in emission trading, practise public or financial reporting, comply with government or voluntary schemes and implement GHG risk management. Table 4.1 gives a summary of the contents of the GHG Protocol.

Table 4.1 Key elements of the GHG Protocol

Standards	Guidance	Calculation tools
Organisational boundaries	Business goals and inventory design	Web-based, user-friendly, step-by-step guidance
Operational boundaries	Accounting for GHG education	Build on IPCC methodologies and industry best practice
Historical data	Identifying the GHG sources	Cross-sector (e.g. mobile and stationary combustion)
Reporting GHG emissions	Managing inventory quality and verification of GHG emissions	Sector-specific

Source Schmitz, S., 2010. *The GHG Protocol: A corporate accounting and reporting standard for GHGs*, <http://www.projects.science.uu.nl/nws/nenergy/Proceedings%204th%20workshop/separate%20files/Pdf/Final%20Proceedings15.pdf> [Accessed 10 February 2011]

The GHG Protocol is also compatible with the UNFCCC Kyoto Protocol's Clean Development Mechanism (CDM).¹⁸ The CDM requires that emissions from certain projects be certified for certified emission reductions (CERs).¹⁹ The generic accounting stages for a project under the GHG Protocol are as follows:²⁰

- Stage 1: Identify the project activities
- Stage 2: Identify the primary effects
- Stage 3: Consider all secondary effects and evaluate their significance
- Stage 4: Develop a baseline scenario
- Stage 5: Estimate baseline emissions
- Stage 6: Monitor project activity emissions
- Stage 7: Quantify GHG reductions

Since GHG reductions are monitored against a baseline emission scenario, GHG accountants should know how to establish baselines that address the concept of additionality according to the Kyoto Protocol and other voluntary standards. Under the GHG Protocol, baselines can be developed using two methodologies: the project-specific procedure and the performance standard procedure.

ISO 14064: Greenhouse gas accounting and verification

The ISO 14064 standard provides an auditable, standardised process for GHG quantification and verification that ensures that 'a tonne of carbon

is always a tonne of carbon'.⁶ This standard has already been incorporated in governmental GHG mechanisms in Australia and Canada. The ISO 14064 methodology is very similar to that of the GHG Protocol.⁷ However, it contains additional requirements, the most notable being that emissions should be calculated and reported by site.⁸ In addition, uncertainty should be calculated and reported, and the assessment (verification) report made public.

ISO 14064 is the latest addition to the ISO family of international standards for environmental management.⁹ It consists of three standards detailing specification and guidance for GHG inventories, GHG projects and their validation and verification. ISO 14064 was developed to provide an international standard against which GHG emission reports can be voluntarily verified.¹⁰ These standards allow organisations to take part in emission trading schemes using a globally recognised standard. The benefits of ISO 14064 include:²⁶

- ensuring credibility, consistency and transparency in GHG quantification, monitoring, reporting and verification,
- increasing investor confidence by demonstrating to stakeholders and insurance companies that the organisation is managing and reducing its GHG emissions,
- facilitating the certification and trade of GHG emission reductions or removal enhancements,
- allowing entities to track performance and progress in the reduction of GHG emissions and/or increase in GHG removals,
- enhancing the organisation's brand equity, and
- cost saving by eliminating wastes and improving efficiency.

Like the GHG Protocol and financial accounting, ISO 14064 embodies the principles of regime neutrality, technical rigour, extensive participation and speed-to-market in an effort to deal with the challenges of standardisation in this sometimes complex and always political arena.¹¹ By regularly revisiting the process principles it is hoped that ISO 14064 will provide a variety of users with flexible, credible, verifiable standards applicable across a variety of voluntary or regulatory GHG schemes.

ISO 14064 has been adopted by organisations such as the United Nations Development Programme and the Australian Greenhouse Challenge Plus. The Australian Greenhouse Office has adopted verification guidelines for its greenhouse programmes based on the structure and content of ISO 14064 Parts 1 and 3. This standard is emerging as the

predominant tool for companies undertaking voluntary certifications of their greenhouse inventories and projects. The standard simplifies reporting and development requirements, and helps create equivalent emission reductions in terms of carbon credits. The standard is consistent with the requirements of the Kyoto Protocol, and at the same time maintains a policy-neutral approach to facilitate its use and adoption outside the protocol's national inventory requirements and project flexibility mechanisms. The standard is also compatible with both the corporate and project standards of the GHG Protocol. Therefore, ISO 14064 helps to link international efforts on climate change in a way that complements the range of emerging national and regional approaches.

Publicly Available Specifications 2050: 2008

PAS 2050: 2008 (Specification for the Assessment of the Life Cycle Greenhouse Emissions of Goods and Services) was published by British Standards. This specification outlines the approach required when accounting for embodied carbon in a product or service.¹² PAS 2050: 2008 provides a method for assessing the GHG emissions arising from products (goods and services) across their life cycle, from initial sourcing of raw materials through to manufacturing, transporting, consumption and, ultimately, waste disposal or recovery. It is aligned with the UK government's aim of reducing its GHG emissions by 80 per cent by 2050.¹³ The standard, whose development was co-sponsored by the Carbon Trust and the Department for Environment, Food and Rural Affairs, is the first widely consulted method that specifically addresses the emerging interest of organisations and consumers alike in understanding the carbon footprint of goods and services. PAS 2050: 2008 includes six GHGs identified in the Kyoto Protocol and is intended for use by organisations of all sizes within all sectors of industry. Requirements for system boundary, data requirements for analysis and calculation of results are all specified in PAS 2050: 2008.¹⁴ Conformity with PAS 2050 ensures that the assessment of the GHG emissions of a product's life cycle is complete. The principles of relevance, completeness, consistency, accuracy and transparency have to be taken into consideration during the assessment.

The PAS 2050: 2008 certification follows verification, which allows organisations to make claims of compliance in the public sphere.¹⁵ The certification process allows organisations to get the assurance that the data that they put into the public domain has been verified. PAS 2050 ties in with other ISO series, such as ISO14000 and ISO 14001. Examples

include ISO 14021 for Environmental Labels and Declarations, ISO 14044 for Lifecycle Assessment and ISO 14064 for Organisational and Project Level Carbon Footprints. Although not mandated, PAS 2050 can be implemented in conjunction with ISO 14001 when dealing with environmental management systems (as part of the determination of the significant environmental aspects of activities, products and services).

International Wine Carbon Calculator Protocol

Companies are under pressure to reduce their carbon footprint to measurable levels. The wine industry is facing increasing regulatory and retailer pressure to quantify and reduce its carbon footprint. The International Wine Carbon Calculator Protocol was designed primarily as an enterprise tool for the international wine industry, in compliance with current international standards and practices for GHG accounting.

The International Wine Industry Greenhouse Gas Accounting Protocol, developed through a partnership between the Wine Institute of California, New Zealand Winegrowers, South Africa's Integrated Production of Wine programme and the Winemakers' Federation of Australia, was launched by the global wine industry in 2008. The aim is to provide a free, easy-to-use, wine-industry-specific GHG protocol and calculator to measure the carbon footprints of winery and vineyard operations of all sizes. GHG issues, such as gaining market access to retailers interested in carbon footprinting, providing data for marketing purposes and/or carbon credit accounting, are becoming more significant to brand image. The protocol, therefore, provides general guidance on the significant emissions relating to individual products in the wine industry.

The development of a carbon accounting protocol for the international wine industry was based on the methodology outlined in the GHG Protocol.¹⁶ Other reference material was extensively consulted, including ISO 14064.¹⁷ In addition, ISO 14044 was also used to identify realistic process boundaries. In the development of the wine industry protocol, care was taken to incorporate the important aspects of PAS 2050 in the accounting methodology. The calculator establishes scopes of emissions in the wine life cycle to be included in product footprint calculations. These include:

- Scope 1: Direct emissions over which the company has control via ownership of activities and which are included in

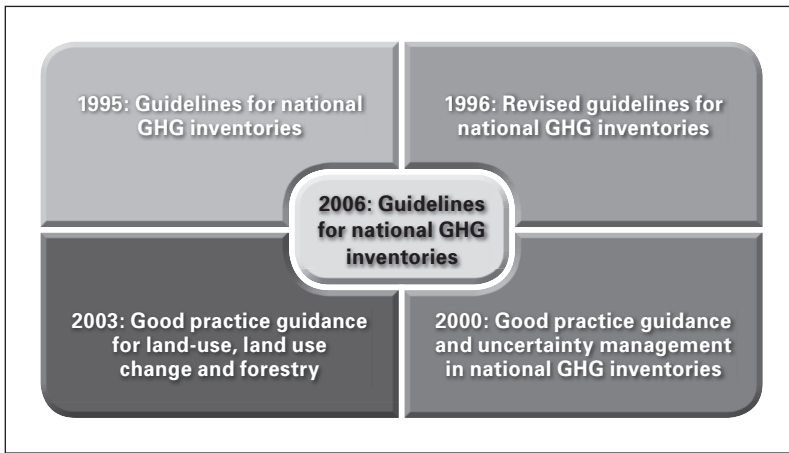
mandatory reporting schemes. Examples include stationary fuel use, such as water heaters, frost-fighting equipment and boilers, and mobile fuel use, such as tractors, trucks and harvesters.

- Scope 2: Indirect emissions from the production of purchased electricity, heat or steam, also included in mandatory reporting schemes.
- Scope 3: Indirect emissions from all activities that are purchased from other companies, which may be included in product life-cycle analysis. Examples include the extraction and production of purchased materials, such as fertilisers, packaging material and transportation of purchased products to the winery or transportation of wine products to the point of sale.

Intergovernmental Panel on Climate Change guidelines

The IPCC has put in place a number of guidelines and good-practice publications concerning carbon accounting. The IPCC guidelines include those published in 1995, 2000, 2003 and 2006. The structure of the guidelines and good-practice publications is shown in Figure 4.2. The revised 1996 guidelines incorporate major potential land-use sources of emissions. Emissions from agriculture and land use, land-use change and forestry (LULUCF) were integrated into one framework in the 2006 guidelines in order to resolve inconsistencies and avoid double counting.¹⁸ In the 2000 good-practice guidelines, the concept of good practice guidance (GPG) is defined and applied to the agriculture sector.¹⁹ The 2003 GPG for LULUCF covers all carbon pulls and provides guidance on the representing land area. In the 2006 guidelines, agriculture, forestry and other land uses are merged in a reporting sector known as AFOLU (agriculture, forestry and land use). There has also been improvement in methodologies.

A specialist area in which carbon accounting skills are required is the REDD+ mechanism. This mechanism is highly relevant as far as South Africa, and Africa as a whole, is concerned in that, for a long time, governments from developing nations have been fighting hard within the UNFCCC system to have REDD+ recognised for climate change mitigation. The IPCC Good Practice Guidelines put across twin variables that need to be measured and estimated in order to determine changes in total forest carbon for REDD+ purposes.²⁰ These variables

Figure 4.2 2006 IPCC guidelines for national GHG inventories

include forest area change and carbon stock change estimation or emission factors (carbon per hectare). The forest area change must deliver spatially explicit trajectories of forest area change, which examines deforestation and regrowth of forests, and this must be done in accordance with approach 3 of the IPCC guidelines of 2003. Techniques such as remote sensing and geographical information systems are appropriate instruments to use. These methods permit an easier and more credible evaluation of both historical and future deforestation rates. The carbon stock change estimation or emission factors (carbon per hectare) are considered to be in line with the three levels (tiers) of detail and accuracy provided by the IPCC GPGs. Tier 1 relies on global default data; tier 2 requires national data (i.e. from forest carbon inventories); tier 3 requires that detailed measurements of carbon stock changes be provided for different carbon pools.

There are five reporting principles that underlie the IPCC guidelines, and these are based on traditional accounting: consistency, comparability, transparency, accuracy and completeness.²¹ The challenge in terms of carbon accounting is that data and estimates of many countries currently do not fully meet these reporting principles. The IPCC guidelines require all data, intermediate results and estimates to be acquired and analysed transparently and made available to all key actors, and subjected to independent international review mechanisms. Herold and Skutsch²² have devised MRV objectives for the different phases of REDD+ mechanisms. The three fundamentals in REDD+ mechanisms

include strategy, readiness and implementation. The objectives associated with each of these three fundamentals are shown in Table 4.2.

Herold and Skutsch³⁹ go further and give details of institutional and capacity issues. As a country moves into the readiness phase it must put in place systems of coordination, measurement and monitoring, reporting and verification. As far as coordination is concerned, a high-level national coordination and cooperation mechanism should be established. This mechanism links forest carbon MRV and national policy for REDD+, and specifies and oversees roles, responsibilities, co-benefits and other monitoring efforts. To facilitate measurement and monitoring, protocols and technical units for acquiring and analysing data at national and sub-national levels must be developed. In terms of reporting, a unit should be established that is responsible for collecting all relevant data in a central database, for national estimates and international reporting, according to IPCC GPG, and for recording uncertainty assessments and improvement plans. Lastly, verification implies that an independent framework for verifying long-term effectiveness of REDD+ at different levels and by different actors must also be put in place. It is within these structures that carbon accounting and carbon accountants have a role to play as part of the bigger picture – a role that cuts across disciplines and institutions. At the least, Herold and Skutsch⁴⁰ advise that states should consider putting in place the following institutions: a national coordination and steering body or advisory board, including a national carbon registry; a central carbon monitoring, estimation, reporting and verification authority; and forest carbon measurement and monitoring units.

Table 4.2 MRV objectives for REDD+ mechanism

REDD+ phase	Associated MRV objective
Strategy	Provide information and fill data gaps for national policy strategy development
Readiness (upfront capacity building)	Develop capacities, conduct detailed historical monitoring and implement at least an IPCC Tier 2 national forest carbon-monitoring programme and provide data for reference level
Implementation	Establish consistent and continuous MRV-supporting REDD+ actions and IPCC GPG-based accounting

Source: Adapted from Herold, M. and Skutsch, M., 2009. Measurement, reporting and verification for REDD+: Objectives, capacities and institutions. In A. Angelsen (ed.), *Realising REDD+ National strategy and policy options*. Bogor: Center for International Forest Research, p.92

Cancún agreements – COP16

The draft decisions of the UNFCCC during Cancún 2010 raised issues of GHG MRV.⁴¹ Bullet 61 maintains that internationally supported mitigation actions will be measured, reported and verified nationally. These will also be subject to international MRV processes, in accordance with guidelines yet to be developed under the UNFCCC. Issues of MRV relating to GHG were included in the Copenhagen Agreement during COP15.⁴² The UNFCCC Cancún agreements also decided to develop, as necessary, modalities for the MRV of human-related forest-based emission sources and removals from sinks, forest carbon stock and forest area changes.⁴³

Decision 44 under the Kyoto Protocol deliberations (CMP6) during Cancun 2010 defines ‘standardised baseline’ as ‘a baseline established for a [p]arty or a group of [p]arties to facilitate the calculation of emission reduction and removals and/or the determination of additionality for clean development mechanism project activities, while providing assistance for assuring environmental integrity’.⁴⁴ The application of the standardised baselines will be at the discretion of the host country’s designated national authority, with the CDM executive board periodically reviewing the standardised baselines used in the methodologies.⁴⁵ The two decisions undertaken by both the UNFCCC and the Kyoto Protocol negotiation tracks have bearings on the training and reorientation of carbon accountants in Africa.

Carbon-Accounting Frameworks in South Africa

South Africa does not possess well-defined and mature carbon-accounting frameworks of its own. However, considerable progress has been made in this area, especially if one compares South Africa to its African peers and other emerging economies. South Africa uses most of the international carbon-accounting policy frameworks. There has been progress in developing policy regimes for carbon accounting, as witnessed by the development of the Long-Term Mitigation Scenario, the Carbon Disclosure Project, involvement with the Kyoto Protocol’s CDM, the announcement of GHG emission reduction targets in 2009, the Green Economy Initiative, the South African Fruit and Wine Industry Carbon Calculator Protocol, and the Draft National Climate Change Strategy of 2010. Some of these national carbon-accounting proposals and initiatives are considered in the following sections.

National Climate Change Response Green Paper (2010)

The National Climate Change Response Green Paper⁴⁶ probably stands out as the piece of legislation that has the greatest potential to address the issue of carbon accounting in South Africa. The Green Paper makes reference to the MRV of GHG emissions. The government is proposing that a draft climate change response MRV system be in place by 2012. Such a system would meet South Africa's requirements for response monitoring and, at the same time, align it with evolving international MRV requirements. The proposed MRV system will address matters relating to general climate change and overall mitigation efforts (which will include REDD+).

The Green Paper indicates that the country's mitigation interventions are informed by, and will be monitored and measured against, the peak, plateau and decline emission trajectory.⁴⁷ The GHG emissions are expected to peak in 2020 and 2025 at 34 per cent and 42 per cent, respectively, below a business-as-usual baseline.⁴⁸ After this, the GHG emissions are expected to plateau from 2025 to 2035 and start to decline in absolute terms from 2036 onwards. The Green Paper also notes that MRV is likely to be a key component of future global climate governance systems. In terms of the MRV system, the country proposes to develop, test and commission a web-based GHG emission reporting system as part of the National Atmospheric Emission Inventory component of the South African Air Quality Information System by 2012.⁴⁹ In addition, the government expects to put in place a mandatory submission of GHG emission data to the National Atmospheric Emission Inventory by all significant emitters and compilers of GHG-emission-related data and/or proxy data by 2013. Furthermore, by 2014, the government will publish an annual report comparing actual GHG emission data with the emission trajectory. Finally, a register will be kept detailing climate actions that result in the mitigation of GHG emission. This will also be used for measuring progress against the overall GHG emission trajectory and prescribed national reduction targets.

Fruit and Wine Industry Carbon Calculator Protocol

The South African Fruit and Wine Industry Carbon Calculator Protocol (Carbon Protocol) has been established as a result of mounting pressure from retailers and consumers for GHGs to be quantified, especially in the UK and EU.⁵⁰ The Carbon Protocol provides a standard protocol

for measuring, monitoring and reporting GHG emissions in the sector. The Carbon Protocol has been developed in alignment with the GHG Protocol, ISO 14064, the PAS 2050, the International Wine Carbon Calculator and the Australian Wine Carbon Calculator. The Carbon Protocol also draws from the work of the IPCC and the UNFCCC in terms of the global warming potential of GHGs,⁵¹ and from the Kyoto Protocol's LULUCF initiative.⁵² In addition to the five principles of GHG accounting laid out in the GHG Protocol, the Carbon Protocol mentions the need to adopt a conservative approach. This call for the use of conservative assumptions, values and procedures ensures that GHG emission reduction or removal by sink enhancements is not overestimated.⁵³ The boundaries in the Carbon Protocol include general (i.e. electricity and fuel usage), which is to be completed by all users, farm and pack-house facilities, cold-storage facilities, winery facilities and distribution.

Carbon accounting in other South African policy regimes and initiatives

The South African government ratified the UNFCCC in 1997 and the Kyoto Protocol in 2002.⁵⁴ Inherent in the Kyoto Protocol is a system of MRV of GHG emissions and carbon credits, expressed in the form of emission reduction units.⁵⁵ In addition, in 2007, South Africa developed the Long-Term Mitigation Scenario, which projects that GHG emissions will peak between 2020 and 2025, plateau up to 2035 and start to decline in absolute terms after 2035.⁵⁶ Other national policies that require the government to account for its carbon include the 2008 Energy Efficiency Strategy, which seeks to have the final energy demand reduced by 12 per cent by 2015;⁵⁷ the 2010 Industry Policy Action Plan, covering the period 2011–2013;⁵⁸ and the Integrated Resources Plan for Electricity, covering the period 2010–2030.⁵⁹ Furthermore, the government of South Africa pledged during the Copenhagen Climate Summit to reduce its emissions by 34 per cent by 2020 and 42 per cent by 2025.⁶⁰ In May 2010, the government called for a Green Economy Summit and defined its agenda to move towards a low-carbon South Africa.⁶¹

From a business perspective, corporate South Africa has fully embraced carbon accounting and disclosure. This is being done through the Carbon Disclosure Project (CDP), initiated in 2007.⁶² The CDP is a voluntary international carbon disclosure initiative founded in 2000, with its head office in London.⁶³ In South Africa the top JSE 100 companies are supposed to report on and disclose their carbon footprints. The GHG

Protocol is widely used for carbon accounting in the CDP.⁶⁴ Inherent in the CDP in South Africa are the leadership index and performance rating for companies. Another voluntary initiative is the Carbon Protocol of South Africa, a not-for-profit (Section 21) company that aims to be an advocacy group promoting and providing guidance on carbon neutrality.⁶⁵ The Carbon Protocol of South Africa draws its principles from the GHG Protocol, ISO 14064 and the PAS 2050, discussed above.

Future of Carbon Accounting in (South) Africa

As a global player, and judging by the outcomes of both the Copenhagen and Cancún climate summits, carbon accounting in South Africa is set to increase in significance. This is supported by the fact that South Africa pledged to reduce its GHG emissions by 34 per cent in 2020 and 42 per cent in 2025. The government has also drafted a Green Paper that

Table 4.3 Comparing and contrasting traditional accounting and GHG accounting

Generic aspects	Specific aspects	
	Traditional accounting	Carbon (GHG) accounting
■ Involves measuring, interpreting and reporting ■ Rules or guidelines are enforced by accounting standards ■ Eliminates the need for individual firms to develop their own accounting methodologies, and ensures consistency across sectors ■ Can be conducted either for voluntary or regulatory purposes ■ Accounting can be carried out at the level of a project, company or state	■ Involves inflow and outflow of money ■ Based on conceptual and theoretical ideas generally known as accounting principles ■ Involves a framework used in the recording of all accounting transactions and the preparation and presentation of all financial statements	■ Provides an inventory of the gases that are put into and removed from the atmosphere ■ Based on conceptual and theoretical ideas generally known as GHG accounting principles ■ Provides the accounting framework for nearly every GHG standard and programme in the world. Involves a framework for deciding which emission to include or exclude (equity versus control boundaries) ■ Protocol is a set of calculation tools that provide peer-reviewed tools for calculating actual emissions

addresses a climate change response and stipulates a mandatory MRV system in terms of GHG accounting. These gestures oblige key players in the carbon-reduction arena to do something in terms of accounting. It is imperative that those involved in building capacity in carbon accounting understand the synergies and differences between traditional-accounting and carbon-accounting practices (see Table 4.3). Carbon accounting is not going to be restricted within the continent to South Africa, but other emerging economies from the continent will need to play catch-up.

The carbon-accounting profession should be prepared for scaled-up demand for carbon accounting. One key area in which more skills will be required in South Africa, Africa and elsewhere is the REDD+ mechanism. Perfecting the CDP and the desire on the part of increasing numbers of companies to go carbon-neutral will also open up many avenues for carbon accounting. A harmonised national carbon-accounting protocol regime needs to be developed with inputs from accountants and other key actors in this area. Referring to the lack of capacity in the traditional accounting field, Ratnatunga⁶⁶ makes a clear observation when he writes that ‘an inconvenient truth is that the measurement, reporting and assurance frameworks developed in financial accounting and auditing actually hinder the role the profession can play in reducing global warming’.

As in financial management, standardisation is important in carbon accounting. To quote a well-known saying, ‘You can’t manage what you can’t measure.’⁶⁷ Therefore, the GHG Protocol and ISO 14064 have been widely adopted by registries and trading schemes worldwide. As such, these standards serve as the basis for an international standard on GHG reporting. The accounting practices created through the twin standards have become the *de facto* standards for corporate reporting worldwide.⁶⁸ Both traditional accounting and GHG accounting have thus eliminated the need for individual firms to develop their own accounting methodologies, and have ensured consistency across sectors.

Conclusion

The development of the various protocols, standards and principles is of great relevance to carbon accounting and an important step towards a low-carbon future. Proper accounting of GHG emissions can be of financial benefit to business, since it may lead to substantial carbon reduction both in process industries and in the retail supply chain. Among the commonly used international carbon-accounting protocols,

standards and guidelines identified and discussed in this chapter are ISO 14064, which deals with GHG accounting and verification; the GHG Protocol for corporate accounting and reporting standards; the GHG Emissions and Life Cycle Analysis and/or the PAS 2050 Life Cycle Analysis Guidelines; and the IPCC 2006 Guidelines. In the context of South Africa, the Fruit and Wine Industry Carbon Calculator, the Carbon Protocol of South Africa, and the proposed components of the National Climate Change Strategy Green Paper were discussed. It seems that the commonly used international carbon-accounting protocols, standards and guidelines are also used in South Africa, especially by the top JSE 100 companies that are party to the global Carbon Disclosure Project. The chapter also recommends that if Africa is to take part fully in the international carbon market (on both statutory and voluntary levels), then its carbon-accounting profession requires major overhauling in terms of both in-service and pre-service training.

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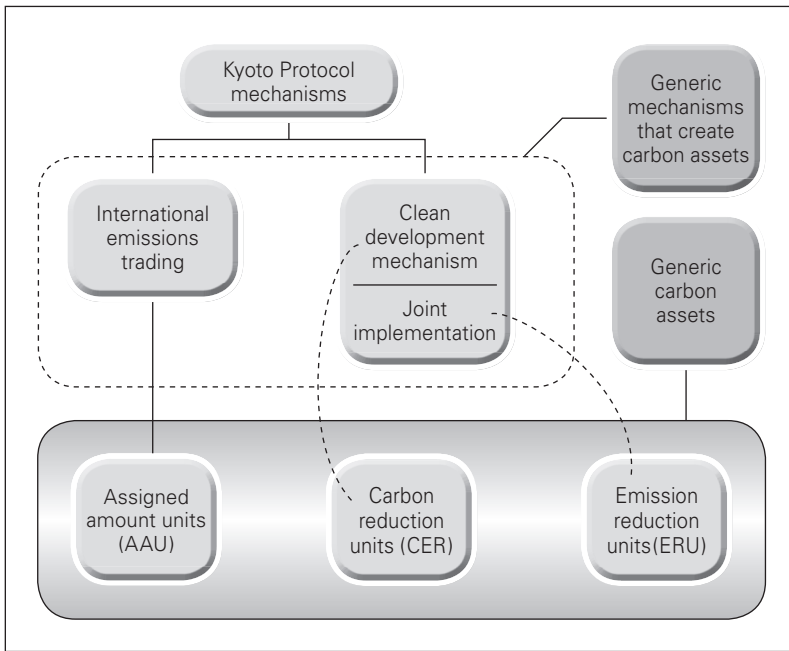
Carbon assets in a contested global climate policy regime¹

Godwell Nhamo and Alfred Bimha

Introduction

Individuals, corporates, financing institutions and governments worldwide are finding new ways of addressing climate change. Opportunities and new methods include the concept of carbon assets and engagement with the carbon market. The focus of this chapter is to understand what is meant by carbon assets and how these have been used in the mitigation of climate change, both globally and in Africa. Since there are so many carbon assets, discussion will be limited to the Kyoto Protocol's Clean Development Mechanism (CDM), the joint implementation (JI) and voluntary carbon asset initiatives, such as the Voluntary Carbon Unit (VCU) or Voluntary Carbon Standard (VCS). The chapter will also deliberate on how Africa is going to be affected by carbon assets as global leaders take longer to agree on a post-Kyoto Protocol framework.

The failure to conclude a new climate treaty both in Copenhagen in December 2009 and Cancún, Mexico, in 2010 has left a policy gap as regards carbon assets and the carbon markets. Carbon assets have their origins in the Kyoto Protocol. The Kyoto Protocol came into force in February 2005 and compels 37 developed countries to collectively reduce their greenhouse gas (GHG) emissions by 5.2 per cent between 2008 and 2012 from 1990 levels.² This scenario creates the demand for carbon assets, thereby establishing carbon markets. The Kyoto Protocol stipulates three market-based mechanisms by which GHGs can be

Figure 5.1 The Kyoto Protocol and carbon assets

reduced: the JI, emissions trading and the CDM. A summary of the carbon assets under the Kyoto Protocol regime is shown in Figure 5.1.

Carbon assets are defined as ‘greenhouse gas emission reductions generated by a project when project emissions are less than those that would occur in a baseline scenario’.³ The carbon assets come in two major markets: the regulated (i.e. compliance) and voluntary markets.⁴ Although carbon credits are generic, they differ from region to region and from country to country. The compliance carbon credits include certified emission reduction (CER) units, which is the most common and originates from the Kyoto Protocol’s CDM projects in developing countries; emissions reduction units (ERU), which are similar to the CER, but based in the developed nations under the JI; emissions trading, popularised by the EU under its emissions trading scheme (ETS), which generates the European Union Allowances (EUAs) as credits; and the New South Wales Greenhouse Gas Abatement Certificate (NGAC). The NGAC certification process is very comprehensive and goes beyond the Kyoto Protocol requirements.⁵ The voluntary carbon credits include the VCU and VCS credits, which are robust global standards for approval

of credible voluntary carbon credits.⁶ This chapter has two objectives: to continue raising awareness of the new asset regime and to document progress and policy directions regarding carbon assets, with particular reference to Africa.

The Evolution of Carbon Assets

There are over 30 atmospheric GHGs. However, under the Kyoto Protocol⁷ only six attract carbon credits: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (C_xF_x), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF₆). These gases have been regarded as the most significant in terms of disastrous climate change and, therefore, in reducing them, countries earn carbon credits. In terms of the carbon assets and markets, there is a need for a common denominator in terms of the reduction point of GHGs in order to make them tradeable, and this has resulted in making CO₂ the base gas.⁸ Table 5.1 shows how the carbon assets relate to conversion factors in terms of the main GHG emissions and their global-warming potential.

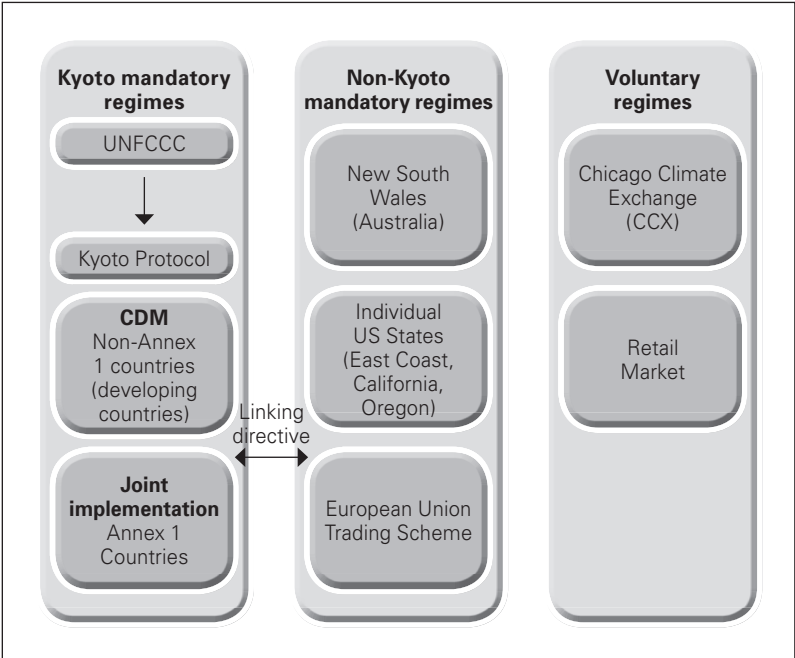
Table 5.1 Carbon assets and conversion factors

Greenhouse gas	Global-warming potential
Carbon dioxide	1
Methane	21
Nitrous oxide	310
Perfluorocarbons	6 500–9 200
Hydrofluorocarbons	140–11 700
Sulphur hexafluoride	23 900

Source: Adapted from UNFCCC 2010, Global warming potentials, http://unfccc.int/ghg_data/items/3825.php [Accessed 26 November 2010]

Carbon credits are measured on a relative scale based on carbon dioxide and global warming potential. For example (see Table 5.1), methane is 21 times more potent as a GHG than carbon dioxide, and sulphur hexafluoride is 24 000 times more potent than carbon dioxide. Carbon credits are always expressed in terms of carbon dioxide equivalence (CO₂e). For example, one tonne of CO₂ = one tonne of CO₂e; in terms of the carbon market, therefore, one carbon credit = one certified emission reduction

Figure 5.2 Carbon market regimes



Source: Adapted from Kelly, R., 2008. *The global carbon market: Status and UNDP's strategy*. Port Louis: UNDP

(CER). It is also necessary to understand that one carbon credit = one CER = one metric tonne of CO₂e.⁹

The *Carbonpedia*¹⁰ explains the compliance and voluntary market carbon credits, which, it claims, adhere to a particular standard or certification. Although carbon credits are generic, they differ from region to region and from country to country, as explained in Section 5.1.

The VCS and VCU credits should:

Be real, the abatement must have occurred, they must be additional by going beyond business-as-usual activities, be measurable, permanent, not temporarily displace emissions, the findings need to be independently verified and unique so they cannot be used more than once to offset emissions.¹¹

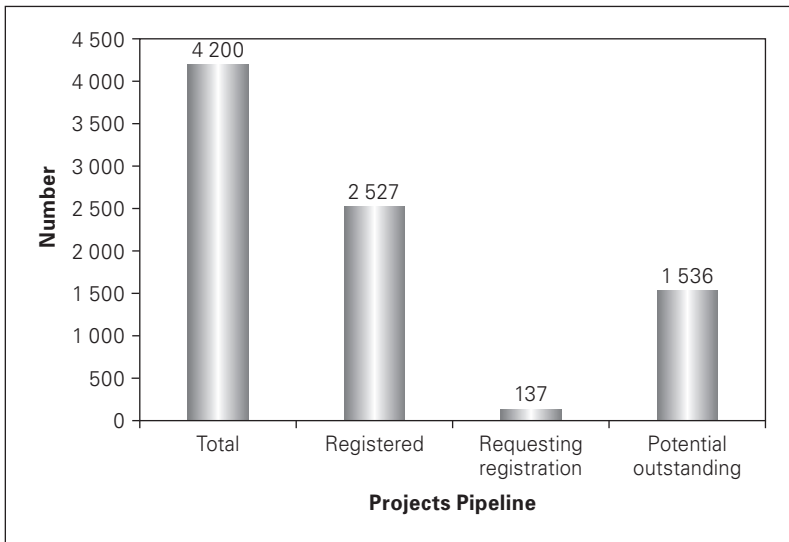
Globally, the VCS is the preferred and most commonly chosen standard in the voluntary market because it is compatible with the Kyoto Protocol provisions. It can also be applied to a wide range of project types and

methodologies. There are 45 carbon markets, principally categorised into three regimes, as shown in Figure 5.2.

In addition to the VCS and VCU credits,¹² there are Verified (or Voluntary) Emissions Reduction (VER) and Gold Standard VER, commonly used to offset GHG emissions. Most CDM and JI projects can deliver VERs before compliance assets such as CERs and ERUs. The VERs could also emerge when the purported CDM and JI projects fail to reach optimal levels for the mandatory requirements owing to the size of the project and the inhibiting costs associated with compliance registration. The Renewable Energy Certificate (REC) is also included in the voluntary carbon credit market. An REC is not a carbon credit measured against one tonne of CO₂e emissions. Instead, the REC relates to how much CO₂e is saved by the adoption of renewable energy and how efficiently one megawatt hour of electricity can be produced. The RECs provide financial subsidies in the power sector and help renewable-energy projects become more feasible. New technologies, such as solar, wind farms, geothermal power plants, wave-collection technology, hydroelectric power, tidal power, renewable biomass, etc., are becoming increasingly recognised in this area. As RECs displace CO₂e they also have potential for producing carbon credits, such as VCUs, VERs or CERs (depending on their location).

The perceived quality of emission-reduction certificates varies widely, ranging from VERs on the one hand to Gold Standard CERs on the other. Each market has a significantly different price, and prices vary widely between the voluntary and compliance markets. In addition, the various segments within these markets also differ in terms of price. There is a range of fundamental factors and external events that have caused carbon prices to show substantial volatility over time, which means that they represent a significant price risk.

The first mechanism in terms of market share is international emission trading. This involves selling carbon allowances to another country accompanied by high demands of emission reduction. The largest implementation of emission trading to date has been the EU-ETS. The second mechanism is the CDM, a project-based mechanism that allows credits from emission-reduction projects in poorer (developing) countries to be used by rich (developed) countries to meet the rich countries' commitments under the Kyoto Protocol. The third mechanism is the JI; this is also a project-based mechanism that facilitates countries with binding targets to obtain credit from projects carried out in other countries with binding targets.

Figure 5.3 Clean development mechanism projects pipeline to 2012

Source: Adapted from UNFCCC, 2010. CDM statistics, <http://cdm.unfccc.int/Statistics/Index.html> [Accessed 25 November 2010]

Carbon Assets in a Contested Climate Regime

In December 2009, global leaders met in Copenhagen with the intention of reaching a legally binding post-Kyoto Protocol agreement. This agreement was not reached and, instead, a non-obligatory political accord was signed by the heads of states – known as the Copenhagen Accord.¹³ The failure to reach a binding agreement in Copenhagen gave the wrong signals to the carbon market, as the carbon markets owe their existence to the Kyoto Protocol, which runs until 2012. The overlap of the Copenhagen Accord and the Kyoto Protocol has important implications for the behaviour of the price of securities in carbon markets. A glance at the factors that influence the value of an asset shows that market expectations, risk aversion, market efficiency, arbitrage opportunities, regulation, and demand and supply are just some of the important factors that influence the equation that gives the value of an asset.

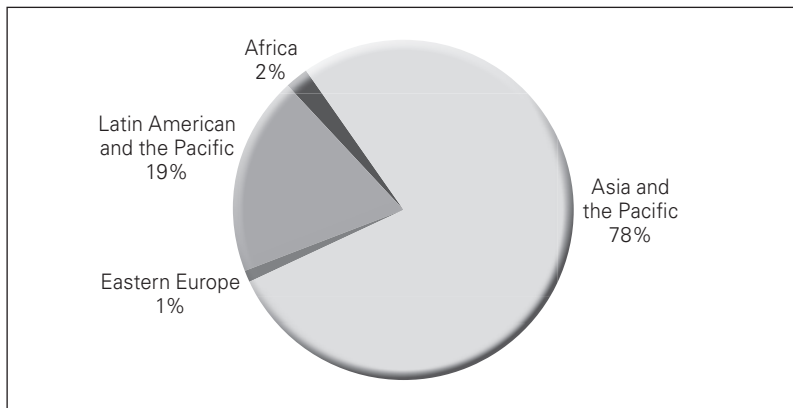
An estimated 4 200 CDM projects, with total carbon assets amounting to 2.9 billion CERs, were expected to materialise by 2012.¹⁴ Further details regarding the CDM project pipeline – those registered, those requesting registration and those outstanding as per the CDM project pipeline – are provided in Figure 5.3. This scenario assumes that there

will be no renewal of CDM crediting after 2012 and this, in itself, is a problem in terms of market indication.

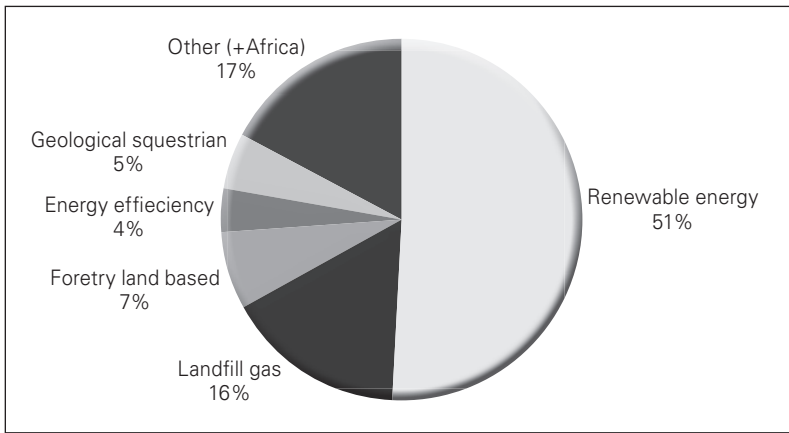
There is still a huge backlog in the uptake of CERs from CDM projects, which is an indication of the potential demand for carbon credits. As of 24 November 2010, an estimated 1,86 billion CERs had been taken up under the registered CDM projects, with a further 30 million accounted for by CDM projects seeking registration under the CDM board. This gives a total of 2,16 billion CERs, and leaves an estimated 0,74 billion CERs outstanding (i.e. 25,52 per cent of the potential CDM market).

The key sectors in which the CDM project CERs are being generated include the energy industries (both renewable and non-renewable sources), energy distribution, energy demand, manufacturing industries, chemical industries, construction, transport, mining/mineral production, metal production, fugitive emissions from fuels (solid, oil and gas), fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride, solvent use, waste handling and disposal, afforestation and reforestation, and agriculture.¹⁵ A further analysis of the share shows that the energy industries (both renewable and non-renewable sources) make up to 63,85 per cent of the projects and this is followed by the waste handling and disposal sector, which makes up 16,22 per cent of the projects.¹⁶ The regional distribution of the 2 530 registered CDM projects presents more insights in terms of activities in Africa (see Figure 5.4).

Figure 5.4 Clean development mechanism projects by region



Source: Adapted from UNFCCC, 2010. CDM registered projects by region, <http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByRegionPieChart.html> [Accessed 25 November 2010]

Figure 5.5 Voluntary market 2008 by project type

Source: Markit, 2010. *Beginner's guide to the voluntary carbon market*. London: Markit, p.10.

From Figure 5.4, the following deductions may be made. Out of the 2 530 CDM projects registered with the CDM Board,¹⁷ a staggering 1 986 (78 per cent) are in Asia and the Pacific region. A further analysis reveals that the largest proportion of these are in China (1 046 CDM projects, or 52,67 per cent) and India (563 CDM projects, or 28,35 per cent). China and India together make up 81,02 per cent of the Asian and Pacific CDM share. The second largest piece of the pie is taken up by Latin America and the Caribbean (with 483 CDM projects), of which the largest proportion is accounted for by Brazil (179 CDM projects, or 37,06 per cent) followed by Mexico (124 CDM projects, or 25,67 per cent). Therefore, Brazil and Mexico combined account for an estimated 62,73 per cent of the CDM project share in Latin America and the Caribbean. Africa comes in third, with 48 CDM projects and Eastern Europe in fourth position, with 13 CDM projects. Of the African CDM projects, 17 (i.e. 35,42 per cent) are in South Africa followed by Egypt with six (12,5 per cent). The next significant share of CDM projects is accounted for by Morocco, with five projects and Nigeria, with four.

If the voluntary credits traded on the CCX are included, the volume of the market for 2008 rises to 123,4 million tonnes of CO₂e, with a market value of \$705 million. Details in terms of the percentages by project type are shown in Figure 5.5. In terms of project location, the majority were in Asia (45 per cent), followed by North America (28 per cent) and the Middle East (15 per cent). The remaining 12 per cent were in other continents (including Africa).

Carbon Assets in Africa

The uncertainty clouding the post-Kyoto Protocol situation means that hopes of having more CDM projects in Africa continue to be dashed. This is in addition to the fact that the continent has always been host to the fewest CDM projects compared with other regions. When one considers the capital outlay needed for a typical CDM project, answers begin to emerge as to why Africa is likely to remain an unfavourable destination, given its risky investment climate. A typical CDM project costs between \$50 000 and \$150 000 in upfront development expenses.¹⁸ In addition, developing a new methodology can cost an additional \$50 000–\$200 000. The transaction costs are usually the same for small and very large projects and, as such, carbon-asset developers favour very large projects, such as those in Asia (especially China and India) and Brazil. In Africa, only South Africa competes favourably. Rau and Toker¹⁹ observe that a CDM project recovering waste heat and gas at a steel plant could generate up to 200 000 carbon credits (200 000 metric tonnes of CO₂e) a year, with a value of up to about \$5 million. Carbon-audit costs for verification purposes could cost up to \$10 000 annually. Carbon assets are sold to banks, brokers or investment funds that resell them to companies that need them.

Africa's breakthrough in terms of future carbon assets came from the Copenhagen Climate Change Summit in 2009. The Copenhagen Accord not only recognised the role that carbon assets from the REDD-plus (REDD+) play in GHG emission mitigation, but also established the Green Climate Fund, which will also finance REDD+ assets.²⁰ The challenge for Africa will be how it will manage REDD+ as an asset, and not mortgage its forests to multinational corporations, agents and multilateral development banks, such as the World Bank, which are financing some of the REDD and REDD+ projects.

There is already further movement to incorporate REDD assets into cap-and-trade systems, with the Californian government having announced in 2010 that it will incorporate REDD assets from Brazilian and Mexican projects into its proposed cap-and-trade system.²¹ Another rush for REDD and REDD+ assets in Africa is highly likely, and the South African government should take note of this. REDD and REDD+ took centre stage in Cancún during the UNFCCC COP16 meeting in December 2010. REDD and its major financing mechanisms are discussed in more detail in Chapter 8.

The world hopes that COP17, which takes place in Durban, South Africa, in December 2011, will eventually make a breakthrough as far as

the successor to the Kyoto Protocol is concerned. Until then, the world will be kept in suspense over the future of at least some carbon assets. African governments and those of other developing countries, especially the G77+China, made it clear that they were looking for progress in terms of the pledges made for the Copenhagen Green Climate Funds in Cancún. They believe a commitment to this fund by the developed countries will be an accurate measure of their goodwill in terms of future climate engagements. A significant move in this direction was realised in Cancún.

Fast-Start Climate Finance

Linked to the Copenhagen Green Climate Fund is Fast-Start Climate Finance (FSCF). The FSCF pledged to mobilise an estimated \$30 billion between 2010 and 2012 and thereafter \$100 billion annually by 2020.²² A summary of the Copenhagen Green Climate Fund pledges and commitments as of 9 May 2011 is provided in Table 5.2. This shows that the developed countries that pledged to finance the FSCF are making good progress on their pledges. As of 19 September 2010, there were only six countries and the EU involved, according to the details provided by the FSCF website²³ (established jointly by major UN agencies, including the UNEP, UNDP and UNFCCC). As of 9 May 2011, there were 20 countries and the EU involved. However, four countries, namely Canada, Ireland, Netherlands and Switzerland, had not honoured a single dollar of their pledges, which are in excess of \$1 billion.

The FSCF has been subject to debate and contestations. Generally, non-Annex 1 countries accuse Annex 1 countries of being slow to finance this fund. Other challenges have been associated with the governing mechanism of the FSCF. In its update of 6 June 2011, Third World Network reported that the first meeting of the transitional committee tasked with designing the Green Climate Fund, to which the FSCF is a part, was fraught with process issues surrounding the election of officers, the agenda and work plan, and rules of procedure. Other issues of concern were the selection of staff to the technical support unit and avoiding a conflict of interest.²⁴ Developing countries view the FSCF as a source of funds that will assist them in mitigating and adapting to climate change. The developing countries also see this fund as a good vehicle for technology development and deployment in their regions. Other areas in which the fund can be utilised include capacity building and awareness raising.

Table 5.2 Fast-Start Climate Finance pledges and committed amounts

Total pledged by country (2009, local currencies)		Total pledged vs committed funds	
		Pledge 2009 (\$ millions)	Committed as of 9 May 2011 (\$ millions)
Australia	A\$599 million	640	640
Belgium	€150 million	215	57
Canada	C\$400 million	414	0
Denmark	DKK 1 200 million	231	53
European Union	€150 million	215	72
Finland	€110 million	157	35
France	€1 260 million	1 804	601
Germany	€1 260 million	1 804	510
Iceland	\$1 million	1	0,5
Ireland	€100 million	143	0
Japan	\$15 000 million	15 000	7 200
Luxemburg	€9 million	13	4
Malta	€0,8 million	1	0,2
Netherlands	€310 million	444	0
Norway	\$1 000 million	1 000	383
Portugal	€36 million	52	17
Slovenia	€8 million	11	0,7
Spain	€375 million	537	192
Sweden	€800 million	1 145	165
Switzerland	CHF140 million	159	0
United Kingdom	£1 500 million	2 454	929
USA	US\$1 700 million	1 700	1 700

Source: Adapted from <http://www.faststartfinance.org> [Accessed 28 November 2010 and 10 May 2011]

Conclusion

This chapter discussed carbon as an asset and the various forms this asset takes. Among the carbon assets discussed of particular value to Africa were the CDM from the Kyoto Protocol mechanism and the future of the REDD. The CDM is regarded as an asset under threat and one that Africa has not benefited from in the past and is unlikely to benefit from in the near future. At the time of writing, the CDM project pipeline had a deficit of more than 25 per cent if one considers the 2008–2012 period that was set by the UNFCCC. This is in sharp contrast to the fact that, as of 24 November 2010, Africa was hosting only 2 per cent of the 4 200 CDM projects in the pipeline. These statistics need to be understood against the backdrop of the contested post-Kyoto Protocol framework, which has resulted in a huge slowdown in CDM project investments globally. In the short to medium term, CDM investment has also been marred by the global financial crisis, with many developed countries that were allocated carbon-emission caps (Annex 1) still struggling with serious debt. Africa's main hope and potential breakthrough in terms of carbon assets and involvement in the carbon market lie in the REDD. However, African governments and those of other developing countries are strongly warned to adopt a precautionary approach to engagement in REDD. The Copenhagen FSCF, which forms part of the global Green Climate Fund has also become a hot potato. Although pledges have been made by a number of Annex 1 countries, non-Annex 1 countries are still not satisfied with the progress and governance structures of the FSCF.

Notes and References

- 1 This chapter was first presented as a conference paper during The Guy Mhone Conference on Development held in Dar es Salaam, Tanzania, 20–21 December 2010. Additional information and further edits were made to this paper as it appears in this book.
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- 3 World Bank, 2006. *Creating a carbon asset*. Washington, DC: World Bank, p.1.
- 4 Markit, 2010. *Beginner's guide to the voluntary carbon market*. London: Markit.
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- 7 UNFCCC. 1997. *Kyoto Protocol*.
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6

Carbon pricing in cap-and-trade systems

International perspectives and lessons for Africa

Godwell Nhamo and Alfred Bimha

Introduction

A critical issue of the twenty-first century will be how to reduce natural disasters that have been proved scientifically to emanate mainly from intensive industrial and other human activities on a scale that harm the environment. These activities are damaging to the environment, leading to ultra-climatic activities that now endanger the survival of the human race. Therefore, numerous systems and methods have been put in place worldwide to facilitate the transition to low-carbon and green economies, with the aim of improving the economic output of countries as they move away from carbon-intensive industrial activities.

As already noted in Chapter 5, the carbon market was instituted by the Kyoto Protocol, which creates the demand for carbon assets, thereby establishing the carbon market and price regime. Trading in carbon assets has witnessed phenomenal growth since 2004. By 2020 the carbon market for the US alone is predicted to be worth \$1 trillion. The EU became the first zone to implement a mandatory emissions trading scheme (ETS) in 2005. In the US, a number of voluntary cap-and-trade schemes were also instituted: the Regional Greenhouse Gas Initiative (2005), the Midwest Greenhouse Gas Reduction Accord (2007), the Western Climate Initiative (2007) and the California Cap and Trade (2010). The

Chicago Climate Exchange (CCX) is a US corporation existing as a carbon-credit commodities exchange operating without borders.

The chapter seeks to expose the nature of the operating environment for carbon markets in the context of the expectations theory mainly by answering the following questions – Will the market for carbon continue to exist without a legally binding framework? How will carbon prices behave in the post-Copenhagen/Kyoto Protocol convergence era? If the carbon market continues to exist, how will carbon prices be determined in the light of compulsory and voluntary markets and in the context of a highly volatile market with abnormal levels of uncertainty? And how are carbon prices likely to behave? Models such as the Capital Asset Pricing Model, Intertemporal Capital Asset Pricing Model and Arbitrage Pricing models will be explored to assess their applicability to the carbon markets in light of the uncertain future. An assumption was made that this chapter will confirm that a legally binding climate agreement is key to the continued existence of carbon markets. With increased trading in carbon due to the emergence of voluntary markets, the markets will become more efficient and this will result in more efficient allocation of resources by investors.

This chapter proposes that if the carbon asset pricing is to be right, then phenomena such as over-allocation of emissions allowances must be curtailed. This situation resulted in a 66 per cent reduction in carbon credit prices during the period 2005–2007, when they fell to less than a euro.¹ Modern pricing theories and their relation to carbon pricing are analysed in the next section, followed by a discussion of carbon markets and carbon price determination, with particular emphasis on the (South) African situation. The chapter concludes by looking at whether the cap-and-trade system will work in Africa.

Theories and Models of Asset Pricing

Before we delve into asset pricing theories and models, and their relation to carbon pricing, a brief review of concepts that underpin cap and trade will be beneficial. Gilbertson and Reyes² trace the evolution of carbon trading and indicate the Coase theorem³ as the alpha of the carbon trading framework. This theorem is based on the economic concept of externalities. An externality (in some quarters the term ‘transaction spill over’ is used) can be defined as a cost or benefit, not transmitted through prices, incurred by a party that did not agree to the action causing the cost or benefit. A benefit in this case is called a positive externality

or external benefit, whereas a cost is called a negative externality or external cost, and in this case carbon emissions are a negative externality. The Coase theorem proposes the process whereby all parties involved – in this instance with relation to emission activities – can easily organise payments so as to pay each other for their actions. Plausibly, an efficient arrangement is concluded without government intervention, assuming the markets are perfect. However, some scholars have extended the Coase theorem to incorporate the element of governments facilitating bargaining among the affected groups or individuals and enforcing any contracts that result. The pollution-proportional-to-output model⁴ expands this notion by suggesting the assignment of property rights to the firms, giving them the right to produce (emissions) and leading to the affected parties acquiring some of the rights from the firms, thus inducing the reduction of emissions from the firms.⁵ Therefore, briefly, for the Coase theorem to work it requires the proper definition of property rights (in this case emission rights or caps), rationality of economic agents (i.e. firms and people) and the reduced transaction costs. Given these parameters, the private parties (economic agents) can efficiently price and trade to solve negative externalities caused by emissions.

After understanding the economic theories and concepts underpinning carbon trading, the focus now turns to generic pricing models. Adam Smith⁶ first postulated the notion that there is a relational similarity between the basic value and the natural price of a commodity (asset). He expounded that the natural price of the asset is the price that incorporates adequate profit to the owner. The derivation of the basic value of an asset stems from the ability to observe its price in the market, and this observable price is interpreted as the market price in the sense of Adam Smith's theory. In the same vein, with the creation of carbon emissions as a tradeable commodity through the International Emissions Trading Scheme (IETS) under the Kyoto Protocol, it is envisaged, according to Adam Smith's theory of price, that the price of carbon emissions is determined by the IETS. The market price is determined by demand and supply of the asset and, therefore, may be different from its basic value. However, the existing strong empirical evidence indicates that asset prices (and returns) tend to digress from the fundamental value (and appropriate return) to a large extent in the short run, but in the long run follow the fundamental value. In this case, the fundamental value of carbon emissions is derived from oil and electricity prices.

Cochrane and Culp⁷ define and categorise in depth the popular modern asset-pricing theories, with the two fundamental and polar

approaches of absolute and relative pricing. In the case of absolute pricing they assert the valuation of a collection of cash flows (i.e. dividends, coupons, principal, option pay-offs, firm profits and so forth) set on its exposure to fundamentals of macroeconomic risk. They assert that the discount factor is found by identifying which macroeconomic states are of particular concern to investors, and the Capital Asset Pricing Model (CAPM) is a good example of this approach. Most models aligned to absolute pricing theory are based on some kind of general equilibrium in order to use total rather than individual risks, or to substitute an easily measured index, such as the market return (CAPM) for poorly measured consumption. They are, therefore, often called equilibrium asset pricing models. Through the CAPM, Chevallier⁸ priced the risk of carbon assets in a portfolio and found them to be high given the high institutional uncertainty in the newly created carbon markets, in other words the unclear operation of the carbon markets as per the Kyoto Protocol after 2012.

Relative pricing, by contrast, studies an asset's value with prior knowledge of the values of other assets. Where the prices of these other assets come from is not given and information about macroeconomic risk factors is used as little as possible. Modigliani and Miller⁹ pioneered this approach in valuing a firm on the basis of prices for its equity and debt. Black and Scholes¹⁰ have extensively used this approach to value options and corporate liabilities on the basis of stock and bond prices. By virtue of being general, absolute pricing is widely and precisely applicable. Relative pricing, however, is simple and controllable so that approximating a price with this method is easy, but has limited practical applicability. In the case of carbon assets, the relative price is influenced by oil and electricity prices because these two commodities determine the output of carbon emissions, which are carbon assets.

The Intertemporal Capital Asset Pricing Model (I-CAPM) is an extension of the CAPM provided by Merton.¹¹ This postulation shares the same assumptions as CAPM, except that with the I-CAPM investors solve lifetime consumption decisions when faced with more than one uncertainty. Merton posited that investors look to hedge risks based on current and projected factors, such as changes in inflation, employment opportunities, future stock markets and so forth. Hence, the I-CAPM is a multifactor model that attempts to capture more determinants of risk than just the beta. However, the drawback is that it cannot provide clear-cut direction in selecting the additional factors to use and how many to include.

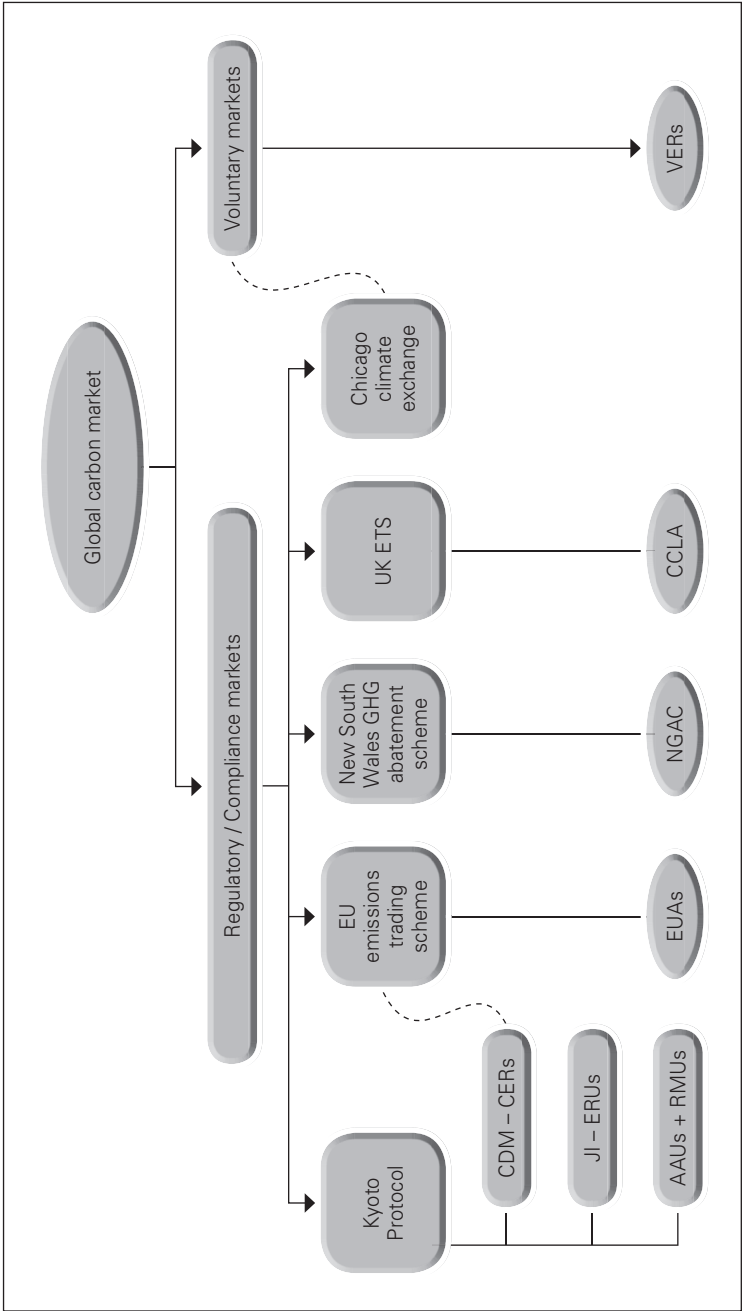
Overall, the above analysis of asset pricing theories shows that carbon assets can be traded and priced in the markets and have similar characteristics as financial assets. However, Kanamura¹² did a study disapproving the postulation that carbon assets are a commodity by analysing the characteristics of carbon prices. Empirical studies done using European Union Emissions Allowances (EUA) futures prices traded on the European Carbon Exchange (ECX) reflected that the convenience yield of EUAs does not reflect the property of commodities because it was negatively correlated to price. Convenience yield pertains to the benefit or premium associated with holding an underlying product or physical good, rather than the contract or derivative product. An example would be purchasing physical carbon emissions rather than EUA futures contracts. Should there be a sudden element that causes the demand for carbon emissions to increase, the difference between the first purchase price of the carbon emission versus the price after the shock would be the convenience yield. In addition, the empirical studies done in the same study using EUA option prices traded on the ECX revealed that the emission prices behave unlike commodities, but instead like securities in volatile smile. In finance, the volatility smile is a long-observed pattern in which at-the-money options tend to have lower implied volatilities than in- or out-of-the-money options. The pattern displays different characteristics for different markets and results from the probability of extreme moves.

Structure of the Carbon Market

The carbon market is highly segmented. With over 45 regimes, only three are widely recognised. There is a wide range of perceived quality of emission-reduction certificates, from Verified Emissions Reductions (VERs) on the one hand, to Gold Standard Certificates of Emissions Reduction (GS CERs) on the other. Each market has a significantly different price, and prices vary widely between the voluntary and compliance markets, but the various segments within these markets also differ in terms of price. Several fundamental factors and external events have caused carbon prices to show substantial volatility over time, presenting significant price risk to projects. There are 45 carbon markets principally categorised into two regimes, as illustrated in Figure 6.1.

The first mechanism is emissions trading, which involves selling carbon allowances to another country with a high demand for emissions reduction units (ERUs). The largest implementation of emissions

Figure 6.1 Carbon market regime



Source: Adapted from Deenapanay, S., 2009: *Mechanisms for mitigation*. Addis Ababa: UNDP

trading to date has been the EU-ETS. The second mechanism is the Clean Development Mechanism (CDM), a project-based mechanism that allows credits from emission reduction projects in poorer (developing) countries to be used by rich (developed) countries to meet their commitments under the Kyoto Protocol. The third is the Joint Implementation (JI), also a project-based mechanism, which facilitates countries with binding targets to get credit from projects carried out in other countries with binding targets.

Carbon assets are mainly referred to as 'carbon credits' or 'carbon offsets', and these are market-based financial mechanisms for supporting behaviours that result in measurable, verified increases in carbon storage (or decreases in CO₂ emissions). Carbon credits can be voluntary or regulatory, domestic or international, large or small projects and short-term or long-term commitments. They are associated with everything from landfills, to farms, to forests to power plants.

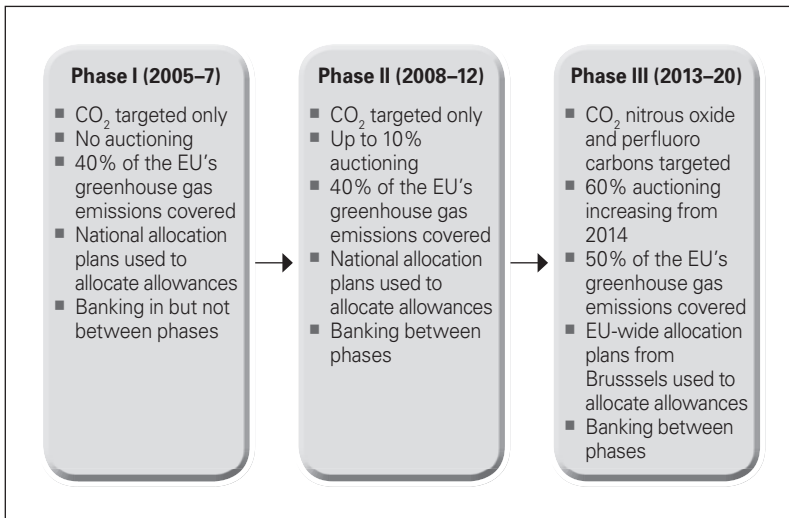
Now that an understanding of the structure of the carbon market and operations has been gained, the next section looks at the ETS, a main component of the global carbon market.

Emissions Trading

Given the impact that emissions trading, especially the so-called cap-and-trade system, has on the global carbon market, this section expands on this system. The main issues to be discussed are the theory and practice of the cap-and-trade system, current issues in the cap-and-trade system, methods in allowance allocation, implications of banking and borrowing on ETS and carbon tax and the credibility of the EU-ETS system.

Theory and practice of the cap-and-trade emissions trading scheme

An ETS attempts to put a price on the emissions of a targeted gas, thus persuading firms to integrate environmental resources into their business decision-making process. The basic concept involves two parties, the governing body and the regulated companies or units emitting pollution. The government sets a cap on pollution, limiting the amount of carbon dioxide and other harmful output that companies or other groups are allowed to release. Typically, the cap is set in physical units (usually tonnes), and is often lower than past emissions and shrinks over time.¹³ The government then issues credits that allow companies to

Figure 6.2 EU-ETS structure

pollute a certain amount, as long as the aggregate pollution equals or is less than the set cap. Since some companies can reduce polluting emissions less expensively than other companies, they may engage in trading any extra permits. Companies that can more efficiently reduce pollution will sell permits to companies that cannot easily afford to reduce pollution. The companies that sell the permits are rewarded; those that purchase permits must pay for their negative impact. Applied to climate change, this system would theoretically reduce carbon emissions at the lowest total cost. Trading occurs until all gains from trade have been exploited and the price of an allowance is equal to the (marginal) cost of cutting emissions. The cap sets the environmental effectiveness of the ETS and market forces guarantee allocative efficiency.¹⁴

The EU-ETS officially began on 1 January 2005. The first 'warm-up' phase operated from 2005 to 2007. The second phase began in 2008 and runs until 2012, set to coincide with the Kyoto compliance period. The first phase focused only on CO₂ (the principal greenhouse gas (GHG)) and on several large installations in key industrial sectors. The overall cap (and hence the stringency of the programme and the resulting cost of emissions reductions) in the emissions trading scheme was made up of individual country caps set by each nation's national allocation plan (NAP). The second phase of the EU-ETS involves tighter overall caps (in line with the economy-wide emissions target set by the Kyoto

Protocol) and is being expanded to other GHGs (depending on available verification) and additional sources and sectors, such as aluminium and aviation. A structural view of the evolution of the EU-ETS is depicted in Figure 6.2.

Contemporary issues in cap-and-trade system

The ability to reduce carbon dioxide emissions has given CO₂ the characteristic of being a stock, thus tradeable on the ETS. CO₂ does not have spatial or temporal considerations due to it being a uniform externality.¹⁵ This is not similar to the emissions of sulphur dioxide, which have larger negative implications if their emissions in one particular area are increased, causing 'hot spots'. The impact of carbon emissions does not, therefore, depend upon emissions in a single year, but the accumulated stock over a long period of time.¹⁶

Butzengeiger, Betz and Bode¹⁷ postulate two main conditions that must hold in order for an ETS to be feasible. The first is that there should be a variety of participants in order to reap potential gains from trading allowances (a motivation for trading in the market). Having similar firms would bring a stalemate in the market. Either net buyers or net sellers with the equivalent abatement costs would mean that no trade would occur. In practice, however, this should not normally be a problem. Secondly, there should be an ample number of polluters included in the scheme in order to ensure a reasonably liquid market. This increases the quantity of trading that occurs and allows a clear price signal to emerge. In turn, this reduces the uncertainty that participants face when making long-term investment decisions because the expected gains from investing to abate are much clearer. Furthermore, the risk of any single participant holding extensive market power, which would restrict trading, is reduced.¹⁸ Chen et al.¹⁹ discuss power generators' profit from the carbon trading market. They used a transmission-constrained oligopoly model to examine the short-run implications of CO₂ trading for power production, prices, emissions and generator profits in north-west Europe in 2005. Simulation results indicated that the rates at which CO₂ costs were passed through to wholesale prices were affected by market competitiveness, merit order changes, and demand and supply elasticities. Consequently, they claimed that emissions trading resulted in large windfall profits, much but not all of which were due to free allocation of allowances. Profits also increased for some generators because their generation mix had low emissions, and so they benefited from power price increases.

Methods used in allowance allocation: Grandfathering versus auctioning

How to allocate the initial endowment of allowances has generally been the most controversial aspect of emissions trading schemes in practice.²⁰ Theoretically, auctioning is preferable to grandfathering, which allocates allowances for free on the basis of historical emissions data. This free allocation of allowances has been adopted for the purpose of 'buying' industry acceptance, lack of familiarity with auctioning of environmental ministries or fears for 'competitiveness'. During the first phase of the EU-ETS implementation it became clear that auctioning had not been abandoned, but merely postponed.²¹ Also during phase 1 of the EU-ETS auctioning was surprisingly little used. Only four member states (Denmark, Hungary, Lithuania and Ireland) had applied it, of which only Denmark used the maximum of 5 per cent. In practice, grandfathering has often been the allocation method of choice, particularly when schemes are first set up. The amount of allowances allocated is crucial for the credibility of the ETS, as stringent caps are needed to create scarcity.²² In the same vein most NAPs foresaw modest caps and high dependence on projections. It turned out that most, if not all, projections were largely inflated,²³ an frequently observed phenomenon in government forecasting.²⁴ This combination of modest cuts, close to actual emissions and inflated projections led to excess allowances. Kettner et al.²⁵ estimate the oversupply to be about 97 million MtCO₂ out of a total of about 2,2 billion MtCO₂ of annual EU allowances, which is almost 5 per cent of total annual allowances. There is similar evidence that caps for the ETS sector have been set too low, requiring the non-trading sectors to reduce above their 'fair share' in order to allow member states to reach their Kyoto Protocol targets. This increases the costs of achieving the overall EU (Kyoto) target – which is quite a concern.

Auctioning has many desirable features. The first is that it sends out a price signal for allowances, which promotes price transparency.²⁶ This increases information and certainty within a scheme, and hence facilitates long-term investment decisions on whether to reduce or purchase allowances. Secondly, the government can then recycle revenues in the form of lower income taxes to businesses impacted by emissions trading, use funds to invest in the development of clean or low-emitting technologies, use them to offset distortionary taxes or to fund research and development into green technology. For example, in the federal proposal for an ETS in Australia, it is suggested that the revenues from the periodic

auctioning of unused permits will be used, in the first instance, to support the emergence of low-emissions technologies and measures to improve energy efficiency. Furthermore, as noted by Buchner et al.,²⁷ cutting distortionary taxation on capital and labour in Europe appears particularly desirable because of the persistence of relatively high unemployment in the EU. Finally, auctioning reduces distortions within an ETS, as it allows new entrants to be treated the same way as incumbents, in other words all participants must buy their allocation of allowances.

Similarly, Chevallier et al.²⁸ evaluated the influence of institutional information disclosure on the carbon market. They used the historical data of the carbon option price in 2006 to 2007 on the ECX, and revealed that the influence of information disclosure on the carbon market was the exact opposite of that found on equity markets, whereby periods of increasing market volumes coincided with periods of higher volatility. This primarily concerned the allowance allocation system of the EU-ETS, especially in the context of a low environmental constraint by the EU-ETS. In a different study that went beyond the carbon price dynamics in the ECX, Daskalakis et al.²⁹ looked at the three main carbon markets for emission allowances within the EU-ETS, namely Powernext, Nord Pool and ECX. They found that the prohibition of banking of emission allowances between different phases of the EU-ETS had a significant impact on derivative pricing. It was universally acknowledged that the potential of the carbon market has not been fully exploited, and its future trend might be closely correlated with policy adjustment and the systemic arrangement of global climate change. On this subject, Streimikiene and Roos³⁰ claimed that the EU-ETS had not yet delivered its real potential to reduce emissions in a cost-effective manner. They also argued that from 2005 to 2007, the carbon spot price collapsed as a result of over-allocation of emission allowances. For 2008 to 2012, a more stringent carbon emission cap was set, but the generous access to credits from JI and CDM could still limit the emission reductions taking place in the EU. Zhang and Wei³¹ hold that the above arguments of attributing the carbon spot price collapse to allowance over-allocation are not completely correct. However, they also believe the concern about the future operation of the carbon market should be taken seriously.

Implications of banking and borrowing on the Emissions Trading Scheme and carbon tax

One period of trading allowances allows participants to find the lowest cost form of abatement at a given point. A key feature of an optimal ETS

in theory, however, is the inclusion of banking and borrowing, which allow firms to find the lowest cost compliance method over time.³² In a world of perfect certainty, an ETS and a carbon tax on a targeted emission would be equivalent. However, in practice, they diverge owing to uncertainty. A carbon tax gives a stable price, but an ETS is more certain of achieving its environmental goal through the cap it imposes on emissions. Banking and borrowing allow an ETS to display both of these properties because they act to stabilise the price of an allowance. If the price begins to rise, then borrowing for future allowances increases supply to prevent a price spike. Likewise, if the price falls then firms can bank allowances to use in the future. This reduces supply and creates a price rise. These attributes, therefore, reduce price volatility by converting uncertainty in demand into fluctuations in quantities, rather than prices, thereby allowing the imposition of a fixed cap in the presence of uncertainty.³³

Although some form of banking and borrowing is, therefore, desirable in principle, one would not want this to be unlimited. If unlimited banking of unused allowances were permitted in the current period, it might lead to a loss of momentum in abatement efforts in future periods as companies take the easy option of using up banked allowances rather than making serious efforts at further abatement. Conversely, allowing too much borrowing might lead to abatement efforts being forever postponed, which is clearly not desirable. Some banking and borrowing should, therefore, be permitted, but fine judgements are required on what limits should be imposed on this in practice. These limits will, however, in turn restrict to some degree the extent to which price instability in an ETS can be smoothed out through banking and borrowing. There are, however, other options, involving setting price ceilings and floors in a hybrid scheme.

Credibility of the EU-ETS system

The credibility of the system is also of the utmost importance in order to ensure that expectations are in line with desirable policy outcomes. Firstly, the time horizon of the policy must be long enough to allow long-term investment decisions to come to fruition. If this is not the case, then insufficient investment in abatement will be the outcome.³⁴ This does raise difficulties in practice, since it requires successive governments to stick to the policies of their predecessors. This is particularly problematic for climate change where a global approach is

required, with policy shifts by a future government in any of the major economies potentially causing the whole international agreement to unwind. This is a particular risk at the point where new treaties need to be negotiated – although there is also the possibility that the global policy consensus could move in a direction more favourable to tackling climate change at these key renegotiation points. Secondly, there must be strict and accurate monitoring of emissions in order to preserve the environmental integrity of the ETS and send a credible signal to participants that the emissions constraints are binding. Finally, penalties for emitting more than the allowances held must be sufficiently high and related to average market prices in order to discourage non-compliance by the participants.³⁵

Carbon pricing

A value can be placed on carbon assets (or carbon credits). A carbon credit is defined by Rau and Toker³⁶ as ‘a financial contract representing a verifiable annual reduction or avoidance of one metric tonne of greenhouse gas emissions’. At the time of writing their paper, the price of a metric tonne of GHG emissions ranged from a few dollars to more than \$40. The carbon credit in a regulated market is issued by the UNFCCC CDM board; in a voluntary market it is issued by a number of accredited organisations. The Voluntary Carbon Standard was the dominant standard for 2009 and issues the Voluntary Carbon Units (VCUs). Other standards (in order of market share as of 2008) include the Gold Standard, the Climate Action Reserve (CAR), the American Carbon Registry (ACR), Chicago Climate Exchange (CCX), Greenhouse Friendly, Climate Community and Biodiversity, Social Carbon, ISO 14064, CarbonFix, Plan Vivo and the Kyoto Protocol’s CDM/JI standard.³⁷

Ernst & Young³⁸ maintains that carbon markets are relatively immature, and as a result the pricing mechanism has demonstrated high levels of volatility. Among the price mechanism determinants buyers are looking for are the following factors: a fair price and terms; strong counterparty and solid underlying fundamentals, such as land rights; legal title to the CERs; well-defined and transparent structure; clear project documentation and robust monitoring procedures and plans; solid institutional framework in the host country; low transaction costs; and appropriate risk-reward spectrum. Carbon-credit sellers, on the other hand, are advised to take note of the pricing and structure of

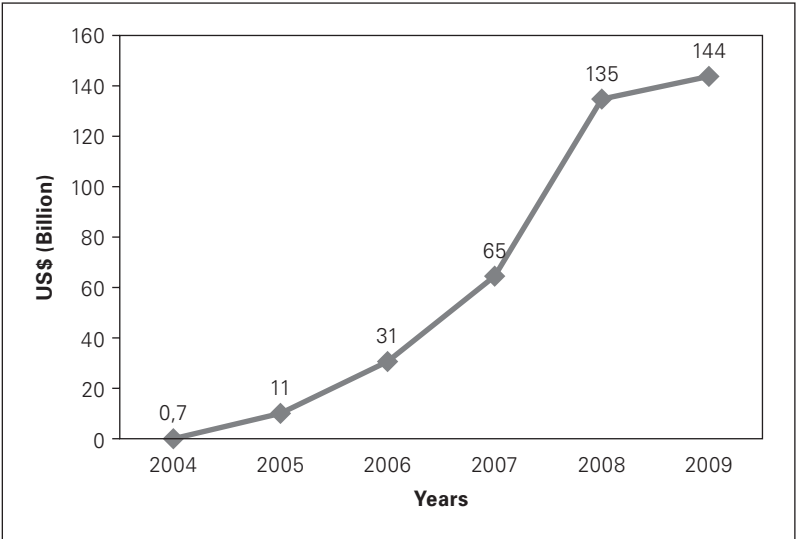
deals, volumes offered and option deals; guarantees and penalties for delivery; buyer counterparty risk; and the timing of deliveries and communication requirements of buyers.³⁹

The carbon market has been on an upward trend since 2004. The value of the carbon market rose from \$0,7 billion in 2004 to \$144 billion in 2009 (see Figure 6.3, which shows the trends in the carbon market). Figure 6.3 includes statistics from the primary and secondary CDM carbon credits, those from the EU-ETS, other allowances and other project-based credits.

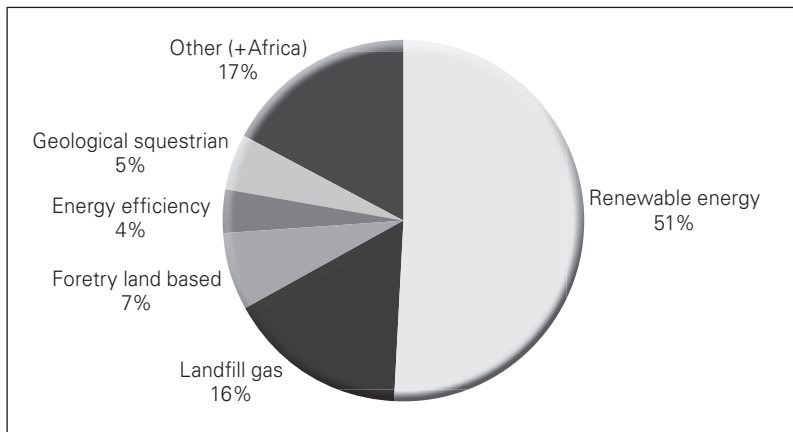
Markit⁴⁰ provides valuable statistics on the voluntary carbon market. The data used by Markit was drawn from a comprehensive global survey of the voluntary carbon market by Ecosystem Marketplace and New Carbon Finance. In terms of volumes and values, Markit indicates that an estimated 54 million tonnes of carbon dioxide equivalent (CO₂e) were traded over the counter (not on exchange) in 2008. This compares to 43,1 million tonnes of CO₂e in 2007. The over-the-counter trade was worth \$396 million in 2008 compared to \$263 million in 2007.

If the voluntary credits traded on the CCX are included, the volume of the market for 2008 rises to 123,4 million tonnes of CO₂e, with a market value of \$705 million. Details in terms of percentage by project type are shown in Figure 6.4. In terms of project location, the majority were

Figure 6.3 Carbon market value trends (2004–2009)



Source Adapted from Kossoy, A. & Ambrosi, P., 2010. *State and trends of the carbon market 2010*. Washington, DC: World Bank

Figure 6.4 Voluntary carbon market by project type (2008)

Source Adapted from Markit Group, 2010. *Beginners' guide to the voluntary carbon market*. London: Markit Group, p.8

in Asia (45 per cent), followed by North America (28 per cent) and the Middle East (15 per cent). The remaining 12 per cent were in other continents, including Africa.

Carbon price determinants

Carbon price determinants are greatly influenced by policy directions at a global level.⁴¹ In addition, general global economic trends influence the pricing mechanisms. Therefore, the 2008 global financial meltdown played a significant role in terms of carbon price movements. EU installations for EUAs have been severely curtailed by the global financial crisis.

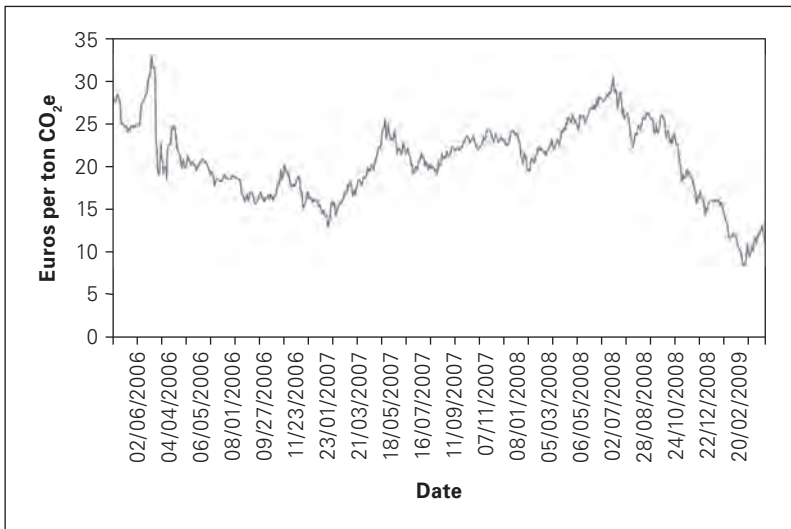
On the global regulatory policy front, the failure to attain a legally binding post-Kyoto Protocol treaty by December 2009 in Copenhagen has brought uncertainty in the carbon market, as long-term decisions need to be made in this area. The only other opportunity, as noted by Capoor and Ambrosi,⁴² is the solid step taken by the EU in its 2020 Climate and Energy Package, which would witness a 20 per cent reduction in GHG emissions by 2020 based on the 1990 levels. During the Copenhagen climate summit, the EU was prepared to move the figure up to 30 per cent reduction in GHG emissions by 2020 if other huge emitters, like the US and China, came to the table.⁴³ The position taken by the EU now guarantees a level of continuity in the carbon market.⁴⁴

Although there is a degree of hope in the sense that the Copenhagen Accord facilitated nations' pledges to reduce their GHG emissions,⁴⁵

these pledges fall far short of what is required in terms of the science behind climate change. Therefore, in the future the true price of carbon will not be reflected, as the pledges effectively reduced the margins in terms of the demand for carbon assets. The other main contention in the carbon markets is the issue of command and control (i.e. government regulation) or cap and trade (i.e. market regulation). Command and control is through the use of carbon tax and emission-reduction standards; cap and trade advocates the creation of carbon markets in order to reduce emissions. However, government control is expensive and complex, and can become inefficient in some developing countries. The cap-and-trade method is mostly preferred because it creates an incentive to reduce GHG emissions and there is a greater probability of meeting reduction objectives than through command and control. The main drawback of cap and trade is the price volatility. It is difficult to make the right decision when the future price of carbon credits is highly uncertain.

Prices of carbon assets have fluctuated significantly owing to fundamentals and major events. The main factors that have affected the price of carbon are regulatory issues, impact of gas-coal spreads, economic growth, the weather and CDM/JI markets. Regulatory issues pertaining to different allocation plans and publication of verified emission reports have affected the carbon prices. Gas-coal spreads have impacted on the economic viability of a fuel switch, which is one of the major emission-reduction initiatives. Economic growth has increased demand for power and, therefore, increased emissions and demand for credits. The weather impacts on the demand for power and the availability of renewable energy, such as hydropower in dry conditions.

In as early as mid-2006, Betz⁴⁶ started probing into what was driving price volatility in the EU-ETS. Her articles assessed price volatility of the EU allowances (EUAs). At the time of Betz's assessment, the EU-ETS was about a year and a half old (it started in January 2005). During this first phase of the EU-ETS, an estimated 2.1 billion EUAs were allocated annually to the EU governments for the period 2005–2007. Prices for the EUAs averaged €26/tCO₂e from January 2005 until the end of April 2006. The price, however, dropped significantly thereafter, reaching a low of €10/tCO₂e following the publication of verified GHG emissions data for 2005. The audit process⁴⁷ showed that a surplus of about 44 tonnes of CO₂e per year had been factored into the EUAs for the first phase. Thereafter, prices traded between €12/tCO₂e and €16/tCO₂e.⁴⁸ In a testimony before the Committee on Ways and Means before the US House of Representatives, Metcalf⁴⁹ recorded similar observations

Figure 6.5: EU Allowances futures prices (2006–2009)

Source: European Climate Exchange, 2010

in terms of EUA price movements. He indicates that in 2007 prices rebounded and reached a peak of €30,53/tCO₂e on 1 July 2008. Following the global financial crisis in September 2008, the prices collapsed to a low of €8,20/tCO₂e in February 2009. By the time of writing in March 2009, prices were averaging €12/tCO₂e. A graph supplied by the European Climate Exchange (see Figure 6.5) shows the trends in prices from June 2006 to February 2009. In his arguments, Metcalf presented a strong case for carbon taxes, as these ensure more price certainty than permits in a cap-and-trade system.

Metcalf⁵⁰ maintains that price volatility in cap-and-trade systems like the EUAs was not unique. To validate this argument he draws from the nitrogen oxide (NOx) prices in the US Northeast States' Ozone Transport Commission. The NOx prices rose sharply to about \$8 000 per tonne in early 1999 before dropping sharply to typical levels of between \$1 000 and \$2 000 per tonne. Similar trends were registered in the permit prices for the California Regional Clean Air Incentives Market, which also rose sharply from below \$5 000 per tonne of NOx to about \$45 000 per tonne in the first half of 2000. Another example cited is the permit prices in the Environmental Protection Agency's Acid Rain Program, which increased to about \$1 600 per tonne of sulphur dioxide (SO₂) in late 2005 from a price of about \$900 at the start of the year.

Betz⁵¹ identified four price determinants of EUAs following the EU experience: immaturity of the EUA market, general price-driving factors, supply factors and demand factors. In terms of immaturity, Betz concluded that new markets have a tendency of requiring time to achieve what she termed 'real price discovery'. The technical problems aligned to getting registries operational also affected the functioning of the EU-ETS. In terms of general price-driving factors, it was observed that there was a small pool of buyers and sellers, which leads to markets reacting strongly to individual trades. Information disclosure indicating a surplus also affected the price movements. Supply factors included uncertainty as to total available EUAs in 2005–2007 and auction details, the supply of CERs under the CDM projects, and the banking and borrowing of EUAs. The demand side was affected by fuel prices and abatement options, weather and economic growth.

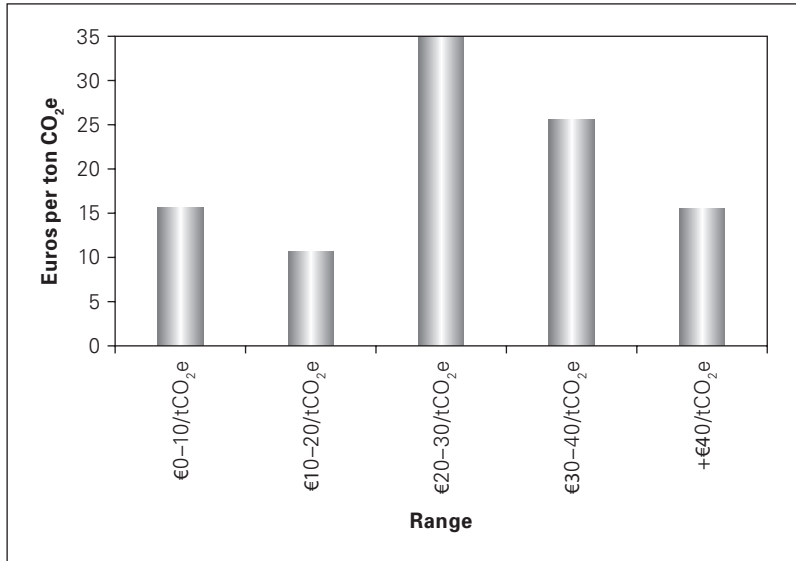
Retamal's⁵² perspective focuses on fuel prices, especially coal and natural gas. He recognises that if the price of natural gas increases to unsustainable levels, power plants that use natural gas are likely to switch to coal and demand CERs for offsetting. This implies an upward movement in terms of demand and hence prices for CERs. Carbon credit prices of between €25 and €30/tCO₂e are said to favour continued use of coal, thereby reducing demand for carbon credits. In addition, higher oil and natural gas prices increase carbon offset prices.

Overall, Betz concluded that market volatility has the potential to exert a negative effect on long-term investment decisions, as it will create a high risk. Plummeting prices lead to loss in overall market value, and this might reduce levels of confidence in the market and carbon assets. As mitigation measures, Betz noted that financial instruments such as forward contracts, futures, swaps and options have been developed for hedging against price volatility. An example is the European Climate Exchange.

Other significant developments that might affect pricing of EUAs include the fact that under phase 2 (2008–2012), the CDM and JI credits will be considered. In addition, aviation GHG emissions will be incorporated as of 2012 and other non-EU members that include Norway, Iceland and Liechtenstein joined the EU in terms of emissions trading.⁵³ Under phase 3 (2013–2020), a number of sweeping changes to address distortions, especially from phases 1 and 2, have been instituted. These changes include the establishment of the EU cap, with allowances allocated to member states; an open-ended banking of allowances; shifting from the allowance system to auctioning; and tightening limits on offsets.

These might have the effect of stabilising prices and increasing prices as demand for carbon assets increases due to restricted supply. Retamal⁵⁴ identifies five possible price regimes for carbon credits between 2013 and 2020 (see Figure 6.6). Of these five possible price regimes, the €20–30/tCO₂e range has the highest probability at 35 per cent.

Figure 6.6 Carbon credit prices (2013–2020)



Source Based on Retamal, C., 2009. *Understanding CER price volatility*. Panama: Carbon Management Consulting Group

In addition to the points raised earlier with regard to carbon price determinants, there are further pointers the authors wish to bring to the reader's attention. Among these additional carbon price determinants, especially in the future, are the role that the G2 (China and the US) will play; general global growth trajectories; the limited numbers of CDM and JI projects at fruition as we move into the future; general consumer behaviour changes; shareholder climate resolutions; growth of the Carbon Disclosure Project (CDP); movements in domestic climate regulatory regimes; changing trends in financing carbon-intensive ventures; and general movements in regional and national foreign direct investment (FDI) climates. These additional carbon price determinants will be briefly discussed next.

China and the US produce more than 50 per cent of total global carbon emissions. China overtook the US in 2006 as the biggest GHG

emitter.⁵⁵ These nations could be either ‘movers’ or ‘shakers’ in terms of the carbon asset pricing mechanisms. Drawing a cue from the Copenhagen 2009 drama, the US and China have come to the table⁵⁶ and this is likely to change the face of the carbon market. The key argument, however, is that the two global giants could do more in terms of climate-change leadership. Similar observations are true in terms of changes in the political rearguard. Political changes in Australia and Japan resulted in more commitments to climate change. In fact, Australia ended up ratifying the Kyoto Protocol in December 2007.⁵⁷

The world is increasingly viewed as a growing, networked village. Hence it is not possible that nations will stop growing their economies. We can only slow it down for various reasons. Given this growth trajectory, various energy mixes will be required, including carbon-heavy mixes like coal, oil and other fossil-based fuels. Hence the world is likely to continue struggling with the consequences of dirty energy that requires offsetting for a few more decades, if not half a century, to come. This will necessitate significant developments in terms of technology, including the manufacturing of electric cars and developments in carbon capture and storage. However, with the estimated streamlining of coal and other dirty forms of energy usage in favour of cleaner energy, demand for carbon could decrease in the long term.

The current CDM, JI and voluntary projects generating carbon credits are mainly of the low-hanging fruit type. These are projects with quick turnaround times and low development and financing costs. Dealers can still afford to buy and sell carbon credits at lower prices and still make business. However, as these types of projects dry up, there is a chance that the cost of developing such projects will be higher and, therefore, the selling prices are also likely to be higher. Although there is still a chance that less developed host countries and regions for the carbon markets, like Africa, may see more activity, the nature of CDM projects in particular might not permit substantial investment.

Consumer awareness in terms of carbon compliance and resilience has grown significantly. Consequently, there is a good chance that the demand for carbon offsetting will rise as companies and other public entities seek to offset their carbon footprints. Linked to growing consumer awareness of carbon compliance is the increasing awareness of shareholders. More and more shareholder climate resolutions are being witnessed globally.⁵⁸

The CDP has been growing steadily since its introduction in 2006 in the UK. The CDP is a global voluntary initiative that involves companies

disclosing their carbon footprint. It is likely to influence carbon asset pricing in that as more and more companies seek to be carbon-neutral, they might require carbon credits to offset. In addition, the amount of carbon credits demanded is also likely to be impacted by the level at which companies reduce their carbon footprints through relatively straightforward and profitable initiatives, like energy efficiency and the use of alternative energy.

The domestic climate regulatory regimes are likely to affect carbon prices. Arguments continue over the best mix between carbon taxes and cap-and-trade systems. Carbon tax regimes will witness stable pricing mechanisms for the carbon credits and this has been taking place for a long time outside the climate change regime. Other climate regulatory regimes, such as instituting specific climate legislation, as in the UK,⁵⁹ will have similar impacts. China is also at the forefront in instituting climate change regulatory regimes, and of late the US and Australia have been engaging with the domestic climate change regulatory frameworks.

The tides of change have finally caught up with multilateral donors and development banks in terms of what to finance and what not to finance within the carbon constraint networked global economy. The World Bank loan of \$3,75 billion to South Africa's energy company Eskom was a challenge.⁶⁰ The US, the Netherlands and the UK chose to abstain from voting owing to environmental concerns. Eventually, the World Bank had to make part of the loan (\$475 million) available for renewable energy, including solar and wind, as a condition for financing the 4 800 megawatt coal-fired Modupi power plant in Limpopo. Given such a scenario, we are likely to witness fewer and fewer loans to finance carbon-intensive investments like those utilising coal and other fossil fuels. This will have an impact in terms of the demand of carbon assets as the corporate word 'greens' itself more in the future.

The last pointer under the abovementioned additional carbon price determinants relates to the general investment climates in countries where CDM and other projects have been and will be established. Generally, CDM and other regulatory carbon assets follow FDI patterns of flow. The OECD⁶¹ mentions the determinants of FDI flows. These include the size, growth and prospects of an economy; natural and human-resource endowments; the cost and productivity of labour; physical, financial and technological infrastructure; openness to international trade and access to international markets; development of the regulatory framework and economic policy coherence; and investment protection and promotion.⁶²

Cap and Trade in (South) Africa

The debate has been raging over whether to adopt the cap-and-trade system to curtail GHG emissions in (South) Africa. Other stakeholders advocate the use of carbon tax in the transition to a low carbon economy, and various reasons are given to that effect. The main motive for advocating a carbon tax is the mandatory penalty that it will enforce, even though this might not induce the required behavioural change from carbon-intensive activities.⁶³ The cap-and-trade system is advocated by some quarters because it allows the behavioural change from high-carbon-emitting activities to low ones through the creation of an emissions-reducing project. When verified and certified, the project's cash flows can be traded in the carbon markets.

Winkler et al.⁶⁴ advocate an understudy of the carbon tax and cap-and-trade system for South Africa. The important issue is to be mindful of the consequences when contextualising these international experiences of carbon pricing. They propose a balance between mitigating emissions and achieving national goals of eradicating poverty and attaining sustainable development, while ensuring that the industries with high emission levels are not the problem, but part of the solution. The authors conclusively advocate pricing carbon through tax, but acknowledge that it is not a sufficient pricing mechanism to reduce emissions in South Africa. However, economic efficiency must be given significant weighting when designing and choosing economic instruments for reducing emissions.

Ebrahim et al.⁶⁵ acknowledge that the only carbon trading in South Africa has been through derivatives and not directly from the trading of carbon credits. Furthermore, it is acknowledged that there is no established CER emission trading or price discovery mechanism in South Africa yet. This brings both opportunity and risk. The JSE justifies this, in that the main risk associated with securing CERs is that their value or price is determined outside of South Africa, and within South Africa their value is indeterminable. This is because there are no carbon trading platforms there, even voluntary ones.

Through its recent national climate-change response paper,⁶⁶ the government has indicated the institution of capacity mobilisation for facilitating and promoting the use of carbon trading and offset schemes. The carbon trading schemes will be investigated as a medium- to long-term policy response to climate change and will focus on the scope and administrative feasibility of trading schemes for South Africa. In other

words, the consideration of using emissions trading, which embodies cap and trade, cannot be done in the short term. Therefore, the issue hinges on the proper setting up of an emissions trading scheme once the deliberations and economic considerations have been concluded.

Conclusion

This chapter has explored the evolution of carbon assets, their pricing, the markets in which they are traded and how they are underpinned by economic theory. Carbon assets resemble the characteristics of commonly traded financial assets, such as bonds, shares and derivatives. It has been shown how the pricing of carbon assets can be explained by popular asset pricing models. Also identified as the determinants of carbon price are the global emissions regulatory regime, major events, immaturity of the ETS markets, supply and demand factors, and general price drivers. Other determining factors include how China and the US, as the leading emitters, will participate in the global ETS; general global growth trajectories; limited CDM and JI projects as we move into the future; general consumer behaviour changes; shareholder climate resolutions; growth of the CDP; movements in national climate regulatory regimes; changing trends in financing carbon-intensive ventures and general developments in regional and national FDI climates.

The cap-and-trade system has proved to be the most popular method for pricing carbon assets. However, the Kyoto Protocol, which created the ETS widely used in the voluntary and regulated markets to trade carbon assets, has created a mirage with regard to the continuation of these markets due to its proposed cessation in 2012. This has caused sharp volatility in the price of carbon assets due to its undetermined renewal and the lack of a mechanism to replace it. From the literature survey carried out in preparing this chapter, it can be established that the ETS has been instrumental in fulfilling the requirement of the Kyoto Protocol. However, Africa, and especially, South Africa, is still deliberating on choosing a suitable way to reduce emissions, either through the carbon tax or emissions trading. The ETS is being implemented as a long-term programme. The carbon tax has also been introduced, but it is widely believed that carbon taxation cannot reduce emissions on its own. The main concern is the ups and downs in the global climate policy regime, which have led to great uncertainty about the future of the cap-and-trade system and the possibility of introducing it in Africa.

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Multilateral development banks

In climate and carbon asset financing in Africa

Alfred Bimha and Godwell Nhamo

Introduction

Africa needs about \$22–31 billion annually until 2015 and then \$52–68 billion annually until 2030 to finance the Millennium Development Goals and disaster response, and to meet the objectives of climate change adaptation and mitigation.¹ Lattanzio² comments that the multilateral development banks (MDBs) are now major players in global climate and carbon asset financing. The MDBs are viewed as having an advantage over bilateral and multilateral UN-backed systems, and other carbon asset financing mechanisms, simply because they dispense funds more efficiently. The environmental focus of MDBs shifted significantly after the G8 leaders' meeting that took place in Gleneagles in 2005. The Gleneagles meeting encouraged MDBs to play a leading role in sustainable development and environmentally friendly technologies.³ Since this G8 meeting, MDBs have launched multiple and multifaceted initiatives addressing environmental concerns, particularly climate change. These initiatives include the need to account for greenhouse gas (GHG) emissions, improve energy efficiency, support renewable energy, manage forests sustainably, promote carbon finance and adapt to climate change.⁴

The subject of carbon financing is still relatively new globally, and this is particularly the case in Africa. As this chapter reveals, carbon asset financing increased significantly after the ratification of the 1997

Kyoto Protocol in 2005.⁵ This opened up the demand for carbon assets, because the Kyoto Protocol allocates GHG emission-reduction quotas to developed countries (commonly known as Annex 1 under the Kyoto Protocol). For these developed countries to remain within their target quotas, they must reduce emissions mainly through the market-based regimes enshrined in the Kyoto Protocol.⁶ To improve carbon asset financing, MDBs have restructured their portfolios and are now involved in carbon asset financing mechanisms through multilateral and own funding mechanisms. Among the multilateral and own carbon asset funds available to the MDBs and African countries are the Clean Technology Fund (CTF), the Congo Basin Forest Fund (CBFF), the Forest Carbon Partnership Facility (FCPF), the Forest Investment Programme (FIP), the Pilot Program for Climate Resilience (PPCR), the Scaling-Up Renewable Energy Program in Low-Income Countries (SREP) and the Strategic Climate Fund (SCF). The World Bank is a major player in climate financing and established the Prototype Carbon Fund in 1999. The World Bank Prototype Carbon Fund grew to \$2 billion in 2008.⁷ The Prototype Carbon Fund was supported by money from European countries that sought to fulfil their Kyoto Protocol GHG emission-reduction quotas. The World Bank has provided more than \$4,8 billion of its own funds and more than \$13,8 billion in co-financing on climate initiatives. The World Bank currently operates more than 10 carbon funds.⁸

To provide a holistic picture of carbon asset financing, it is essential to explain the theory behind the MDBs, including their history, operation and the protocols that govern MDBs' loans and concessions approval. In addition, a section will be dedicated to briefly reviewing carbon asset financing arrangements from other MDBs, including the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), and the Inter-American Development Bank (IDB). Note that these MDBs are not the focus of this chapter.

This chapter (which is based on a literature search) aims to continue the discussion on carbon asset financing in Africa, discuss possible sources and conditions, and think about how African institutions and governments could engage with such funding provisions. The role of the World Bank and the African Development Bank (AfDB) will be under the microscope as we look at the details of the amounts and the nature of the carbon funds available. Policy perspectives will also be given for possible use by key interested and affected stakeholders. The authors also hope to contribute to the body of knowledge by raising awareness of the subject under discussion – one that is still relatively new in the

finance field. The main question to address is which climate and carbon asset financing mechanisms are in place (from both the World Bank and the AfDB) for use by African countries and under what conditions? Aligned to these objectives and the research question are the following objectives: to evaluate the extent to which MDBs have embraced and mainstreamed climate change into their funding mechanisms; to determine key climate and carbon asset funding mechanisms from the World Bank and the AfDB; to establish how such funds are utilised in Africa; and to establish if there is any difference in the approval process and disbursement protocols of such funds compared with other traditional portfolios of the World Bank and the AfDB. Note that this chapter uses online data provided by Climate Funds Update (<http://www.climatefundsupdate.org/>), the World Bank (<http://www.worldbank.org/>) and the African Development Bank (<http://www.afdb.org/en/>).

Theory of Multilateral Development Banks

MDBs are public financing institutions. They have a mandate to alleviate poverty by financing projects and policy in developing countries.⁹ According to the World Bank,¹⁰ MDBs are institutions that provide financial support and professional advice for economic and social development activities in developing countries. Among such banks is the World Bank Group and four regional development banks, including the ADB, the EBRD, the IDB, and the AfDB. The MDBs primarily finance large infrastructure and other development projects and mainly provide loans tied to government policy reforms.¹¹ Most MDBs have two facilities from which they make loans (called 'loan windows'): firstly, a non-concessional lending window that provides loans to middle-income countries at market-based interest rates; and, secondly, a concessional lending window that provides loans at below market interest rates and gives grants to low-income countries. The MDBs have a number of ways in which they generate financing. These include shareholder capitalisation, replenishments, concessional trust funds and capital markets.¹²

Frey and Schneider¹³ postulate four competing models by which the World Bank lends to developing countries. These models were constructed and econometrically estimated by pooled time series and cross-section data. The first model is the *Needs model*, which stipulates that the World Bank extends most of its credits to those countries that are in greatest need of such financial aid. The second model is the *Deserts model*, which is based on the premise that the countries that exhibit

strongest potential for development will get most credits (funding) from the World Bank. A point of venture might be the need ascertain whether climate change financing by the World Bank and the MDBs reflects this model. The third model is the *Benevolence model*, which World Bank officials view as 'benevolent bureaucrats' fulfilling their task according to the officially declared goals contained in the bank's charter. The charter will be inferred to state that developing countries that have a structural balance of payments deficit (which implies high external debt, all other things being equal) receive more credits (funding) than countries that are developed. The fourth model is the *Politico-economic model*, which expounded the bureaucracy tendencies inherent in the World Bank's individual members (i.e. the top officials, presidents, vice presidents, directors, assistants and deputy directors). The utility is composed of the prestige enjoyed within the banking community and the discretionary power exerted vis-à-vis donor and recipient governments.

The World Economic Forum report of 2006,¹⁴ which researched the untapped potential of development finance, had an interesting outcome related to the subject under discussion. The report noted that in the poorest and least developed creditworthy countries direct official lending and grants to the public sector are likely to continue to be the primary vehicles for addressing development needs. Furthermore, it was envisaged that MDBs would continue to have a critical role to play in making direct loans, providing grants and giving policy advice. Mistry¹⁵ postulated that MDBs are under pressure to shift from their traditional areas of activity of financing governments and government agencies to financing investments undertaken directly by the private sector. This has become an important line of activity, especially for catalysing investments that involve the kind of risk and gestation periods that require MDB participation (to provide reassurance to private-sector financiers). Climate and carbon asset financing has witnessed a surge in terms of private investments.

Bezanson¹⁶ gives an analysis of the evolving nature of development finance. He highlights the fact that, initially, the focus was on capital investment and financial resource in financing development. However, he points out that there has been a gradual evolution towards a sophisticated appreciation of the development process and the role of finance in relation to other factors (e.g. human capital, institutions, governance, knowledge, geography and so forth). He asserts that currently the widely held conception is that finance is essential, but not sufficient, for development. In his paper, he notes eight categories of financial instruments

for development, some of which are old and some new. These include bilateral aid, international organisations and agencies, international financial institutions, private sector, international capital markets, international taxes and fees, creation of international markets, and global and regional partnerships. In relation to climate change finance, some of these financial instruments have been adopted, and this has led to the proposal of a carbon tax and the creation of carbon markets in various regions.¹⁷ Climate and carbon asset financing draws funds from most of the categories highlighted here.

The MDBs' joint report of 2007 thoroughly documented an array of financing activities aimed at addressing climate change and reducing carbon emissions. The joint report identified ongoing and planned interventions to give priority to energy efficiency, which included substantially increasing their lending activities in this area, screening investment pipelines for energy-efficiency opportunities early in the project cycle, promoting energy audits, being willing to finance an increased share of total costs of energy-efficiency projects, targeting key countries with the highest potential impact for efficiency gains and helping clients identify and remove institutional, regulatory and policy barriers to efficiency gains. Also included (and highlighted in a report prepared jointly by the MDBs for the UN Secretary General High-Level Advisory Group on Climate Finance) was an explanation on how MDBs can play a supportive role in climate change finance architecture by using a broad range of instruments. Other areas explored by the report include catalysing climate change investments by the private sector, providing technical advice and capacity support to borrower governments, supporting project implementation and sustainability, and supporting carbon market development.

The role of the US in MDB financing and membership is indisputable. In fact, the US is the largest donor to the funding of many MDBs, including climate and carbon asset financing. The US is a member of five MDBs: the World Bank, AfDB, ADB, EBRD and IDB.¹⁸ The US also belongs to two other similar organisations: the North American Development Bank (NADBank) and the International Fund for Agricultural Development (IFAD). Sanford¹⁹ recognises that MDBs have similar programmes, although the programmes differ in terms of their institutional structure and emphasis. As far as governance is concerned, they each have a president and an executive board that manages and/or supervises programmes and operations. With the exception of the EBRD (which provides only market-based loans), all the other MDBs

grant both market-based and concessional loans. Market-based loans are issued to middle-income developing countries, while concessional loans are targeted at the poorest countries. These loans are made to governments or organisations backed by government repayment guarantees. Both sets of loans are prepared by the same personnel, who use the same standards and procedures for both types of loan.

For the World Bank, the International Development Association serves as the concessional loan affiliate. The Asian Development Fund, the African Development Fund and the Fund for Special Operations are similar initiatives for the ADB, AfDB and IDB. The key variations among these initiatives are the repayment terms and the countries that qualify for the loans. MDB market-based loans usually cost more than the rate paid by banks to borrow funds on the commercial market. The International Development Association and the African Development Fund charge about 0,75 per cent annually and, depending on the project and the borrower, the IDB charges 1–4 per cent annually. In addition, the World Bank's International Finance Corporation (IFC) and the IDB's Inter-American Investment Corporation (IIC) make loans to, or equity investments in, private-sector firms on commercial terms without government repayment guarantees.²⁰ The World Bank's Multilateral Investment Guarantee Agency underwrites private investments on commercial terms in order to protect against non-economic risk.

The ownership and share options for MDBs are complex. For example, the World Bank is owned by more than 180 member governments, all of whom are shareholders.²¹ The number of shares a donor country holds roughly corresponds to the size of its economy. In the case of the World Bank, the US is the largest shareholder, followed by Japan, Germany, the UK and France. As a result, the G8 is very influential in World Bank policy regimes. In fact, it is the US that appoints the president of the World Bank. As discussed later in this chapter, the MDBs still invest significantly in sectors that are carbon-intensive, such as transport, oil and gas, electrical power and mining. This state of affairs highlights the paradox of MDBs' engagement with the sustainable-development paradigm.

Understanding Carbon Assets

A detailed explanation of what comprises carbon assets can be found in Chapter 5 of this volume by Nhamo and Bimha. A summary of the concept is given here for the purposes of this chapter. This chapter

highlights the fact that there are many carbon assets, including those stipulated within the three Kyoto Protocol market approaches – the Clean Development Mechanism (CDM), Emission Trading and the Joint Implementation (JI).²² The Kyoto Protocol stipulates GHG emission reduction quotas for 37 developed nations. These states were supposed to collectively reduce their GHG emissions by an average of 5,2 per cent between 2008 and 2012. The global carbon market was created through this international architecture because countries with quotas needed to reduce their GHG emissions. The World Bank pioneered the Prototype Carbon Fund in 2000 and, as of 2008, the bank had more than 10 carbon funds in place for the CDM.²³ To scale up the role of carbon finance in the World Bank, the Carbon Partnership Facility was established. As at mid-2010, Africa was host to 24 per cent of the 195 CDM projects financed by the World Bank, making it second in ranking behind Latin America, which has the highest proportion, at 28 per cent. Other carbon assets featured in this chapter include those from the voluntary market, such as the Voluntary Carbon Unit (VCU) or Voluntary Carbon Standard (VCS) credit, and the Reducing Emissions from Deforestation and Forest Degradation Plus – commonly known as REDD+. Overall, the compliance carbon market that hinges on the success of the Kyoto Protocol accounts for more than 80 per cent of the total global carbon market.

What is a carbon asset? Nhamo and Bimha²⁴ indicate that a carbon asset (or credit) is defined as GHG emission reductions generated by a project when project emissions are less than those that would occur in the absence of such a project. Carbon assets come in two major markets: the regulated (i.e. compliance) and the voluntary markets. Compliance carbon credits include the following: common certified emissions reduction (CER) units originating from Kyoto Protocol's CDM projects in developing countries; the emissions reduction unit (ERU), which is similar to the CER, but which originates from developed nations (economies in transition) under the Joint Implementation; the European Union Allowances (EUAs) from the Kyoto Protocol's Emissions Trading; and the New South Wales Greenhouse Gas Abatement Certificate (NGAC). Voluntary carbon credits include the Voluntary Carbon Unit (VCU) or Voluntary Carbon Standard (VCS) credit, which is a robust global standard for the approval of credible voluntary carbon credits. The GHG emissions reduced as part of the carbon assets from various GHGs (e.g. carbon dioxide, nitrogen oxide and methane) are all converted to carbon dioxide as the base measurement using the global warming potential of

each known GHG.²⁵ All carbon assets are measured using one tonne of carbon dioxide equivalent (represented scientifically as CO₂e). Any entity claiming title to such carbon assets can trade them on the international and domestic markets.

The World Bank²⁶ defines carbon finance as ‘a generic name for the revenue streams generated by projects from the sale of their GHG emission reductions or from trading in carbon permits’. Carbon (asset) finance sets the basis for an innovative scheme to meet the GHG emissions objectives stipulated in the Kyoto Protocol (a scheme that works through a networked global carbon market).

The role of MDBs in Climate and Carbon Asset Finance

This section focuses mainly on an overview in terms of MDBs’ involvement in climate and carbon asset finance. Because the World Bank and the AfDB are the main focus of this chapter, these will be given special consideration later. This section focuses on the Asian ADB, the EBRD and the IDB, as well as other development institutions linked to the subject matter.

The G8 meeting in Gleneagles in 2005 agreed on a Climate Change, Clean Energy and Sustainable Development Plan of Action that challenged and encouraged MDBs to get involved in helping developing nations to respond to climate change.²⁷ The plan of action committed the G8, among other things, to working with the MDBs to expand the use of voluntary energy saving assessments; making optimal use of existing resources and financing instruments; developing a framework for energy investment leading to the accelerated adoption of environmentally sound technologies; exploring opportunities within existing and new lending portfolios to increase the volume of investments on renewable energy and energy-efficiency technologies; and inviting the World Bank to develop and implement best-practice guidelines for screening its investments in climate-sensitive sectors.

Climate and carbon financing: The paradox

As of January 2011, the Climate Fund Update reported that 24 global funding mechanisms for environment and climate change had been announced since 2002.²⁸ Of these 24 funds, which include both multilateral and bilateral mechanisms, eight are administered through MDBs.

The details and operation dates of certain multilateral carbon and climate funds administered by MDBs are provided in Table 7.1.

Table 7.1 Multilateral carbon and climate funds administered through MDBs

Fund	Amount (\$ million)	Administered by	Areas of focus	Date operational
Clean Technology Fund	4 400	The World Bank	Mitigation – general	2008
Congo Basin Forest Fund	165,00	African Development Bank	Mitigation – REDD	2008
Forest Carbon Partnership Facility	221,27	The World Bank	Mitigation – REDD	2008
Pilot Program for Climate Resilience	972,00	The World Bank	Adaptation	2008
Amazon Fund (Fundo Amazônia)	1 000	Brazilian Development Bank	Mitigation – general, adaptation; Mitigation – REDD	2009
Forest Investment Program	512,60	The World Bank	Mitigation – REDD	2009
Scaling-Up Renewable Energy Program for Low Income Countries	307,00	The World Bank	Mitigation – general	2009

Source Based on Climate Funds Update, 2011, <http://www.climatefundsupdate.org> (accessed 16 February 2011)

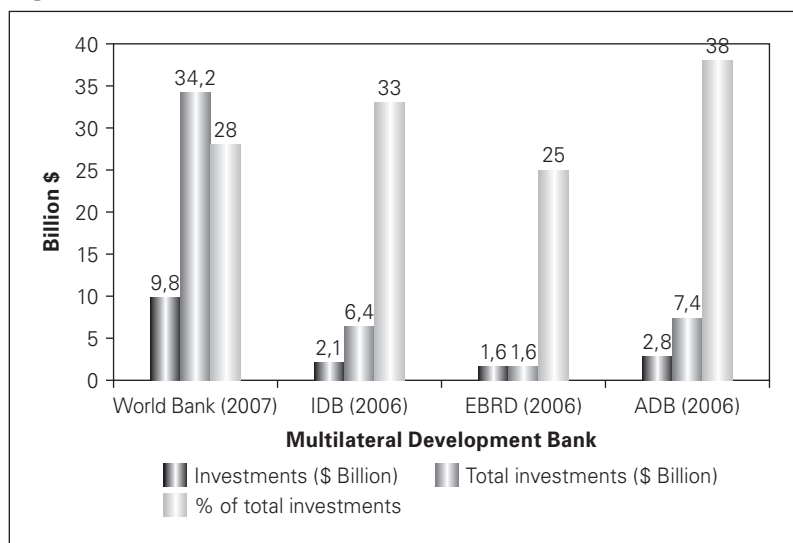
Nakhooda²⁹ states that at a conceptual level MDBs acknowledge that climate change considerations need to be mainstreamed into their operations. The MDBs are said to have launched various new initiatives to address climate change since 2005, and these include efforts to:³⁰

- account for GHG emissions and improve energy efficiency,
- support renewable energy,
- manage forests sustainably,
- promote carbon finance, and
- adapt to climate change.

In addition, the MDBs have produced significant new research and analysis to advance understanding of the linkages between climate change and economic development.

However, the paradox in all this is the fact that MDBs still invest heavily in sectors that are carbon-intensive, such as transport, oil and gas, electric power and mining – an aspect that neglects sustainable development. This is an issue that troubled the World Resources Institute to the extent that it commissioned work to review MDBs' investment portfolios for 2006 and 2007 in the carbon-intensive sector, compare this with their total investments, and then calculate the carbon-intensive investments as a portion of the total investments. The disturbing trend that emerged from this is shown in Figure 7.1.

Figure 7.1 MDBs investment in carbon-intensive sectors (2006–2007)



Source Based on Nakhoda, S., 2008. Correcting the world's greatest market failure: Climate change and the multilateral development banks. Washington, DC: World Resources Institute, p.1

In 2008, the World Resources Institute commissioned follow-up work to check if there had been any improvement in the way in which the four MDBs viewed climate change, specifically in terms of energy pipeline projects.³¹ The survey considered energy projects from 2000 to 2007. The findings were not encouraging. Nakhoda established that more than 60 per cent of financing for the energy sector since 2002 did not take climate change into consideration at all. In 2007, nearly 50 per cent

of the World Bank's lending for the energy sector made no mention of climate change. In the same year, an estimated 60 per cent of the ADB's energy portfolio integrated climate change criteria. However, in 2005 and 2006, more than 60 per cent of the ADB's lending ignored climate change completely. As far as the IDB was concerned, more than 60 per cent in energy sector lending in 2007 ignored climate change completely. A summary of climate change considerations in energy sector lending by the four MDBs under consideration is given in Table 7.2.

There has been serious concern over the MDBs' control of climate and carbon asset funds. After examining the Climate Investment Fund (CIF), which is administered by the World Bank, Marston³² observes that, even where the bank claims to have simply an administrative role, it still tends to have a strong influence on the fund in terms of project design and implementation. Furthermore, bank procedures slow the disbursement of funds, thus limiting access to them by developing countries (this is an example of the way in which the World Bank influences policy). Although both the donors and recipient developing countries have equal participation in the governance structures of the CIF, concern has been raised to the effect that the donors push for their developmental models, thus setting the pace in terms of recipient selection criteria and the technical aspects of project evaluation. In addition to this, the developed countries still have 60 per cent of the vote, while some of the countries from developing regions such as Africa have lost their voting power. Because of limited capacity in some of the new funding mechanisms, the technical support of the World Bank is often solicited, and the technical experts tend to bring with them some of the Bank's traditional culture.

Table 7.2 Climate change in energy pipeline projects (2000–2007)

MDB	Integrates		Mentions		Ignores	
	Amount (\$ million)	% of total lending	Amount (\$ million)	% of total lending	Amount (\$ million)	% of total lending
World Bank	3 714,5	15,6	2 335,8	9,83	17 706,9	74,5
IFC	218,5	5,1	1 569,0	36,7	2 493,0	58,2
ADB	2 838,0	26,7	1 600,0	15,1	6 181,0	58,2
IDB	70,0	1,1	957,0	15,4	5 199,2	83,5

Source Based on Nakhooda, S., 2008. Correcting the world's greatest market failure: Climate change and the multilateral development banks. Washington, DC: World Resources Institute, p.14

Asian Development Bank

The ADB is a key carbon asset financier in Asia and the Pacific. It has committed to an annual target of \$1 billion investment in energy-efficiency projects.³³ In addition to this, the ADB is increasing its efforts to help developing economies move to a low-carbon path by improving their energy efficiency, expanding the use of clean energy sources, reducing fugitive GHG emissions (e.g. methane released from landfills), modernising public transport systems, and arresting the rate of deforestation. Prominent in the ADB efforts are the sustainable management of forests and other natural resources for the provision of clean water supplies, the protection of biological diversity and the sequestration of carbon from the atmosphere. For maximum impact, three priority areas are targeted for urgent action – energy, cities and forests. The ADB offers ‘hard’ loans from ordinary capital resources on commercial terms, and the Asian Development Fund (ADF), which is affiliated to the ADB, extends ‘soft’ loans from special fund resources with concessional conditions. To this end, the ADB has strategised three fronts for financing climate change mitigation and adaptation. Firstly, mobilising concessional resources through a number of mitigation and adaptation funds; secondly, catalysing private-sector investments; and, thirdly, maximising the use of market-based mechanisms, such as the carbon market programme.

European Bank for Reconstruction and Development

The EBRD provides project financing to banks, industries and businesses for both new ventures and investments in existing companies. It also works with publicly owned companies to support privatisation, the restructuring of state-owned firms and the improvement of municipal services. The EBRD’s mandate stipulates that it must only work in countries that are committed to democratic principles.³⁴ The EBRD is directed by its founding agreement to promote, in the full range of its activities, environmentally sound and sustainable development. Direct investments generally range from €5 million to €230 million. Smaller projects are financed both directly by the EBRD and through financial intermediaries. By supporting local commercial banks, micro-business banks, equity funds and leasing facilities, the EBRD has helped finance over a million smaller projects. The EBRD provides loan and equity finance, guarantees, leasing facilities and trade finance. The bank also finances professional

development through support programmes. Smaller projects may be financed through financial intermediaries or through special programmes for smaller direct investments in the less advanced countries. As far as climate change finance is concerned, the EBRD instituted the Sustainable Energy Initiative in 2006, which is divided into six market segments: large-scale industrial energy efficiency; sustainable energy financing facilities through financial intermediaries; power sector energy efficiency; renewable energy; municipal infrastructure energy efficiency (district heating and public transport network rehabilitation); and carbon market support. Since 2006, 260 projects in 27 countries have been financed under the Sustainable Energy Initiative to the tune of €4,5 billion, and this constitutes 21 per cent of EBRD financing for 2009. This has seen 27 million tonnes of CO₂e being reduced in Europe.³⁵

Inter-American Development Bank

Besides its lending activities for member countries, the IDB has lending operations with private-sector companies, both directly and by means of the Inter-American Investment Corporation (IIC), a multilateral lender created by the IDB member countries to help develop small and medium-sized companies in Latin America and the Caribbean. An affiliate of the IDB, the Multilateral Investment Fund uses loans, grants and equity investments to support private projects seeking to bring innovation, boost entrepreneurship or expand access to financing throughout the region.³⁶ The IDB, IIC and Multilateral Investment Fund constitute the IDB Group. In 2009, the IDB established the Energy and Climate Change Unit, which is responsible for the implementation of the Sustainable Energy and Climate Change Initiative (SECCI). The SECCI focuses on four strategic pillars: renewable energy and energy efficiency, sustainable biofuel development, access to carbon markets and adaptation to climate change. Sources of financing the SECCI come from the IDB (the SECCI IDB fund) and from international donors (the SECCI Multi-Donor fund, which includes Spain, Germany, Italy, Finland, the UK and Japan).

Carbon Financing and the World Bank in Africa

Carbon finance is part of the World Bank's bigger response to leverage development finance.³⁷ To this end, carbon (assets) finance complements other financial instruments. Carbon finance initiatives are, therefore,

Table 7.3 World Bank carbon funds to Africa

Fund	Year established	Amount	Percentage of African portfolio (2009)
Prototype Carbon Fund	2000	\$209 million	4
BioCarbon Fund	2004	\$90,4 million	33 (tranche 1)
			20 (tranche 2)
Community Development Carbon Fund	2003	\$128,6 million	32
Italian Carbon Fund	2004	\$155 million	-
The Netherlands CDM Facility	2002	-	1
Danish Carbon Fund	2005	€90 million	4
Spanish Carbon Fund	2005	€290 million	1
Carbon Fund for Europe	2007	€50 million	34 (Middle East and North Africa)
Clean Technology Fund	2008	\$4,4 billion	Not yet specified
Forest Carbon Partnership Facility	2008	\$221,27 million	Not yet specified

Source: Based on World Bank, 2009. Strategic Climate Fund. Washington, DC: World Bank, (compiled from pp.21–67)

not only part of the larger global effort to combat climate change, but also part of the bank's agenda to reduce poverty in the developing world. The World Bank was also the 'incubator' for the largest of the UN environmental funds, namely the Global Environmental Fund (GEF). The GEF was established in 1991 as a pilot trust fund under the World Bank.³⁸ The World Bank operates a number of climate and carbon asset funds. These include the Prototype Carbon Fund, the BioCarbon Fund, the Community Development Carbon Fund, the Italian Carbon Fund, the Netherlands CDM Facility, the Netherlands European Carbon Facility, the Danish Carbon Fund, the Spanish Carbon Fund, the Umbrella Carbon Facility T1, the Carbon Fund for Europe, the Umbrella Carbon Facility T2, the Climate Investment Fund (hosting three other funds), the Clean Technology Fund, the Forest Carbon Partnership Facility and the Carbon Partnership Facility. Some of these funds will be considered

in more detail in the following sections. Details of some of the carbon funds whose data could be located and the African share of their portfolios are shown in Table 7.3.

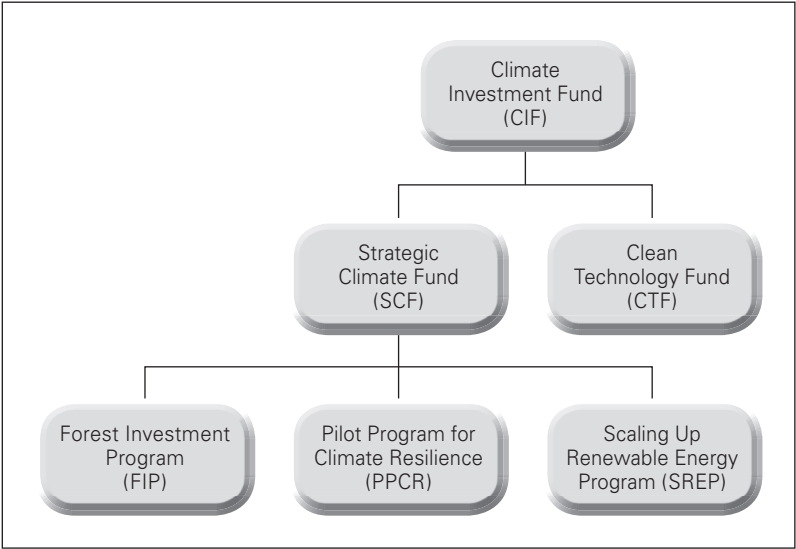
It is not possible in this chapter to provide an in-depth profile of all the carbon funds that are managed and operated by the World Bank. We will focus on just a few of these funds, including the pioneer Prototype Carbon Fund (PCF) and the Climate Investment Fund (CIF), which has four funds under it. The PCF, a first for the World Bank and the first global carbon fund, was established in April 2000.³⁹ Initially, this fund was capitalised to the tune of \$135 million. The PCF helped pave the way for increased participation of public and private buyers. Since the establishment of the PCF, the World Bank has created a host family of carbon funds and facilities that were capitalised at approximately \$2,5 billion (as of mid-2010). The funds involve participants from 16 governments and 66 firms. The World Bank claims that its approach to carbon finance and engagement with the carbon markets addresses three key objectives:⁴⁰

- to ensure that carbon finance contributes to sustainable development beyond its contribution to global environmental efforts,
- to assist in building, sustaining and expanding the market for GHG emission reductions, and
- to strengthen the capacity of developing countries to benefit from the carbon market.

The annual report of the World Bank Climate Investment Fund 2010 indicated that a number of investment plans had been endorsed and projects approved in selected African countries under the CIF. The CIF was established in 2008 to support developing countries in moving towards climate-resilient development.⁴¹ Climate-resilient development minimises the output of GHG emissions. The CIF provides developing countries with grants, concessional loans and risk-mitigation instruments, and obtains financing from the private sector, MDBs and other identifiable sources. Currently, the CIF involves five MDBs – the AfDB, the ADB, the EBRD, the IDB and the World Bank Group – to implement the funded projects and programmes. The CIF hosts twin trust funds: the CTF and the SCF. The SCF, in turn, consists of three funds: the Forest Investment Program, the Pilot Program for Climate Resilience and the Scaling Up Renewable Energy Program in Low-Income Countries. A sketch of the structure of the CIF is given in Figure

7.2. A number of countries are set to benefit from pilot projects funded through the Forest Investment Program to address GHG emissions from deforestation and forest degradation and to promote sustainable forest management. This is an initiative that will be implemented in close coordination with other REDD+ activities. In addition, a separate grant mechanism is being developed to ensure the effective participation of indigenous people and local communities in REDD+ initiatives financed by the Forest Investment Program (FIP). As of 30 September 2010, the FIP had pledges totalling \$558 million.⁴²

Figure 7.2 Climate Investment Fund structure



In terms of governance, the FIP subcommittee has been instituted, with representatives from six contributor countries and six eligible recipient countries. The MDBs, FIP Trustee, GEF, the Forest Carbon Partnership Facility Secretariat, the UNFCCC, the UN REDD Technical Secretariat and self-selected representatives of civil society, indigenous people, and the private sector all participate as observers. So far, there have been pilot projects financed in three African countries: Burkina Faso, the Democratic Republic of Congo (DRC) and Ghana. As of 30 September 2010, the PPCR had pledges totalling \$972 million. The fund is governed by the PPCR subcommittee, which consists of representatives from six contributor countries and six eligible recipient countries and a

high-level representative of the Kyoto Protocol Adaptation Fund Board. Participating observers include the MDBs, trustees of different funds, the GEF, the UNDP, the UNFCCC, and self-selected representatives of civil organisations, indigenous people, the private sector and a community dependent on adaptation approaches to secure livelihoods. At the time of writing, three African countries were benefiting from the fund – Mozambique, Niger and Zambia. The SREP had \$307 million pledged from donor countries as of 30 September 2010.⁴³ It has a similar governance structure. Three countries from Africa, Ethiopia, Kenya and Mali, have benefited from the pilot project.

The CTF provides developing countries with positive incentives to scale up the demonstration, deployment and transfer of technologies that have high potential for long-term GHG emission reduction.⁴⁴ As of 30 September 2010, the CTF pledges stood at \$4.4 billion. Every dollar of CTF funding is expected to leverage \$8 from other sources. In terms of governance, the fund is managed by the CTF Trust Fund Committee, which consists of equal representation of donor and recipient countries. Observers include other MDBs, fund trustees, the GEF, the UNDP, the UNFCCC, the European Investment Bank and self-selected representatives of civil organisations, indigenous people and the private sector. Concessional financing instruments are used (including grants and loans, and risk-mitigation instruments, such as guarantees and equity). The CTF from the CIF has financed plans and projects for a number of African countries, including Egypt, Morocco and South Africa (Table 7.4). As highlighted earlier, the CTF is part of the CIF, which received pledges from 13 countries of more than \$6.4 billion in new funds in 2009 and 2010. These funds will come from Australia, Canada, Denmark, France, Germany, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK and the US.⁴⁵

The Forest Carbon Partnership Facility (FCPF) started in June 2008 and focuses on REDD+. The FCPF works with tropical and subtropical forest countries to develop the systems and policies for REDD+ and provides them with performance-based payments for emission reductions.⁴⁶ The FCPF also complements the UNFCCC negotiations on REDD+ by demonstrating how REDD+ can be applied at national level. The FCPF designed the REDD+ readiness framework, which helps countries prepare for future systems that focus on the financial incentives for REDD+. The REDD+ readiness framework involves participating countries in the development of reference scenarios, adopting a REDD+ strategy, designing monitoring systems and setting up REDD+ national management

Table 7.4 Clean Technology Funds: Plans and projects in Africa

Project	MDBs involved	CIF amount (\$)	Expected co-funding (\$)	Co-funding resources
Egypt – \$300 million				
Wind Energy Scale-Up Program (transmission)	IBRD	150 million	310 million	Private sector, IBRD, government
Wind Energy Scale-Up Program (independent power producers)	AfDB/IFC	50 million	546 million	Private sector, AfDB/IFC, government
Urban transport sector	IBRD	100 million	765 million	Private sector, IBRD, government
North Africa CIF for Concentrated Solar Power (CSP) – \$750 million				
CPS Algeria (three projects)	IBRD, AfDB	160 million	732 million	IBRD, AfDB, IsDB, AFD, SFD, KfW, EIB, JICA, JBIC, government, private sector
CPS Egypt (two projects)	As above	95 million	545 million	
CPS Morocco (one project)	As above	197 million	1,008 billion	
CPS Tunisia (three projects)	As above	186 million	1,854 billion	
Morocco – \$150 million				
Fond de Développement de L'Energie	AfDB, IBRD, IFC	150 million	1,5–1,8 billion	IBRD, AfDB, Hassan I Fund, Kingdom of Saudi Arabia, United Arab Emirates, IFC, private sector
South Africa – \$500 million				
Eskom concentrated solar power	AfDB, IBRD	250 million	350 million	AfDB, IBRD, EIB, KfW
Eskom wind power	AfDB, IBRD	100 million	300 million	AfDB, IBRD, AFD
Private sector renewable energy, energy efficiency or solar water heaters	IFC, AfDB	150 million	1,2 billion	AfDB, IFC, EIB, AFD, private sector

Source: Based on World Bank, 2010. *The World Bank Annual Report 2010: Year in Review*. Washington, DC: World Bank, pp.34–41

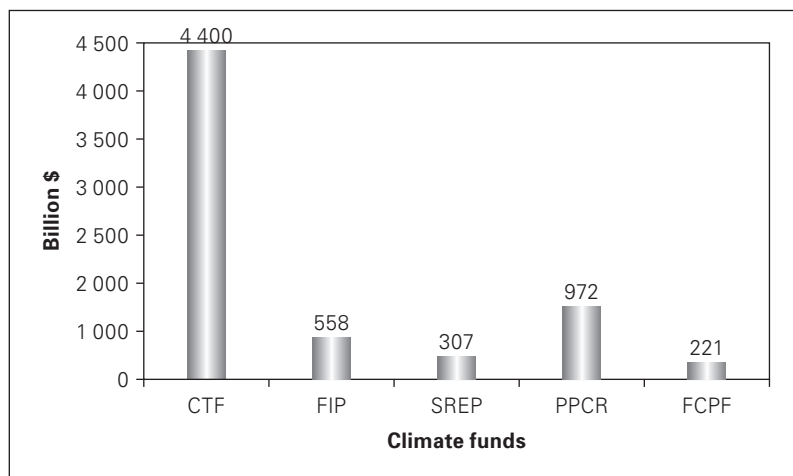
arrangements through the involvement of inclusive key national stakeholders. The FCPF governance structure has a 28-member participants committee elected by the REDD country participants and the financial contributors, six observers nominated by forest-dependent indigenous peoples and other forest dwellers, NGOs and international organisations, and the World Bank.⁴⁷ The World Bank is the trustee for the Readiness Fund; its Carbon Fund provides the secretariat service. The FCPF expects that other entities will join the World Bank as delivery partners.

Thirty-seven REDD countries, of which 14 are in Africa, have been selected in the partnership. Thirteen of these countries, including the African countries of the DRC, Ghana, Kenya, the Republic of Congo and Tanzania, have submitted readiness preparation proposals, which were reviewed by ad hoc Technical Advisory Panels and the Participants' Committee. The World Bank is conducting due diligence on the proposals with a view to entering into readiness grant agreements of up to \$3.6 million to help these countries conduct the preparatory work. (This excludes Tanzania, which is the recipient of other grants.)

In terms of funding, there are 16 donors supporting the FCPF: Agence Française de Développement (AFD), Australia, Canada, Denmark, the European Union, Finland, Germany, Italy, Japan, the Nature Conservancy, the Netherlands, Norway, Spain, Switzerland, the UK and the US. These donors have pledged about \$345 million to the FCPF (\$200 million to the Readiness Fund and \$145 million to the Carbon Fund). It is anticipated that the World Bank's Carbon Fund, which will provide payments for verified emission reductions from REDD+ programmes, will be operational in 2011 as a public-private partnership.⁴⁸ The FCPF cooperates closely with other initiatives, such as the UN-REDD Programme and the Forest Investment Program, which are jointly administered by the MDBs. In 2010, the UK government provided £15 million to the FCPF (of which £10 million is from the Copenhagen Fast Start Climate Finance). The funds are for the development of REDD+ projects in at least 37 countries, the costs of which are already known. A summary of the World Bank-administered carbon asset and climate funds is shown in Figure 7.3.

In Cancún, during the 16th Session of the Conference of Parties (COP), the COP took a decision to invite the World Bank to serve as the interim trustee of the Green Climate Fund. This invitation is subject to a review after three years of the operationalisation of the Green Climate Fund.⁴⁹ The Green Climate Fund was designated as an operating entity of the financial mechanism of the UNFCCC Convention under Article

Figure 7.3 World Bank carbon asset and climate funds (as of 30 September 2010)



Source: Based on World Bank, 2010. *The World Bank Annual Report 2010: Year in Review*. Washington, DC: World Bank, pp.25–31

11. In the long term, the Green Climate Fund will probably be administered by the GEF.

In a paper titled ‘The World Bank: Access or impediment to climate finance?’ Marston⁵⁰ raises certain issues of concern. Proposals to have climate finances under the World Bank, an institution in which there is limited ownership by developing countries, are said to perpetually undermine the UNFCCC. The present authors agree that there has been strong lobbying by the World Bank during the international and bilateral donor discussions to secure its influence in climate financing. The World Bank is alleged to have approached the government of the Philippines and lobbied to have itself as the primary conduit for climate financing. If the World Bank succeeds in its lobbying, it stands to earn fees. For example, a fee of \$350 000 could be charged per each standard investment project within the CIF.⁵¹ This is 40 per cent more than the standard MDB project fee.

African Development Bank and Carbon Financing

The AfDB’s climate change programme focuses on three key areas: financing, adaptation and mitigation. As far as financing is concerned, this includes the mobilisation of concessionary resources, catalysing private capital and the maximisation of market mechanisms. The

adaptation thematic focus considers promoting sustainable land use and water-resource management, building resilient infrastructure and urban systems, and 'climate proofing' AfDB-funded projects. The mitigation thematic focus addresses enhanced investment in renewable energy and energy efficiency, promoting sustainable transport, and sustainable land and forestry management.

From the concessionary financing resources,⁵² the AfDB administers the following funds (some jointly with the World Bank): the Climate Investment Fund, the Global Environment Facility, the Congo Basin Forest Fund (CBFF), the Africa Water Facility, the ClimDev-Africa Special Fund and bilateral trust funds. Private capital is obtained mainly from clean energy bonds, whereas the market mechanisms include the African Carbon Support Project and the carbon market (both from a voluntary and compliance perspective). Some of the funding mechanisms have been dealt with in depth under the section on the World Bank. The focus of this section, therefore, is on the funds not discussed above, such as the CBFF and the African Carbon Support Project.

The Congo Basin Forest Fund

The Congo Basin Forest is second in size only to the Amazon Forest and stretches across six African countries: Republic of Congo, DRC, Cameroon, Gabon, Equatorial Guinea and the Central African Republic.⁵³ The basin's forests have been receiving unprecedented attention owing to their ability to store huge amounts of carbon that could be released into the atmosphere in the event of deforestation and forest degradation. To this end, billions of dollars are lined up for investment in projects that reduce emissions from deforestation and forest degradation (REDD). The REDD projects are included among initiatives that mitigate GHG emissions, thereby contributing positively towards reduced global warming and climate change. Of the six Congo Basin countries, the DRC stands out as the magnet for REDD investment.⁵⁴

The CBFF was launched in London in June 2008 as a multi-donor fund.⁵⁵ The CBFF is probably one of the funds that are very active within the AfDB. This fund received \$200 million from the governments of Norway and the UK,⁵⁶ and currently hosts five countries from Africa (Cameroon, Central Africa, Republic, DRC, Gabon and Republic of Congo). The CBFF will operate for 10 years and will finance projects until 2018.⁵⁷ During a Cancún 2010 CBFF side event organised by the

AfDB, the presidents of the Republic of Congo and Gabon requested a special advance of \$200 million to be made available to the Congo Basin countries to allow them to move a step further in implementing their planned REDD+ projects, given that they had already developed REDD+ strategies. This money was to be channelled through the CBFF. The side event was organised with the objectives of:⁵⁸

- raising awareness of the CBFF's objectives and achievements so far,
- demonstrating the CBFF's capacity to translate REDD+ strategies into results in the Congo Basin countries,
- advocating for the friends of the Congo Basin to contribute to the CBFF, and
- building new partnerships.

In terms of the governing structures, the CBFF has its own instrument, framework and operational procedures.⁵⁹ The CBFF has a governing council and a secretariat that is headed by a coordinator. The secretariat (in the person of the coordinator) reports to the Director for Agriculture and Agro-Industry Department in the AfDB. The board of directors of the AfDB is responsible for making certain decisions concerning the CBFF, as stipulated in the instrument, framework and operational procedures. The governing council of the CBFF has two co-chairs and five members distributed as follows: one senior management representative (at vice president level) of the AfDB; one donor representative (the representation will be on a rotational basis); one civil representative from the region (the representation will be on a rotational basis); the Secretary General of the Economic Community of Central African States; and the President of the Central African Forests Commission (COMIFAC). The governing council also includes four non-voting ex-officio members, among them: the COMIFAC executive secretary, a representative of the UN Environment Programme (also serving as representative of the UN-REDD Programme), a representative of the Norwegian government (when not representing the donors as member) or a representative of the UK government (when not representing the donors as member), and a representative of the Congo Basin Forest Partnership.

In terms of projects, the CBFF has two mechanisms: a regular competitive call for proposals, and projects initiated by the CBFF Governing Council, the Reference Group or other stakeholders in response to identified gaps and needs not covered by submissions received under calls

for proposals.⁶⁰ The CBFF grant funding mainly focuses on slowing the rate of deforestation, reducing poverty among forest dwellers and contributing to a reduction in GHG emissions.⁶¹ This is done simultaneously by maximising carbon stock. To this end, the CBFF identified five key thematic focus areas:⁶²

- Forest management and sustainable practice
- Livelihoods and economic development
- Monitoring, assessment and verification
- Benefits from carbon markets and payment for ecosystem services
- Capacity building in REDD, in monitoring, assessment and verification, and in sustainable forest management

All grants are approved by the AfDB in line with the levels of approval authority, as follows:⁶³ amounts less than €500 000 will be approved by the Director of the Agriculture and Agro-Industry Department; €500 001–€1 000 000 by the vice president; €1 000 001–€2 000 000 by the president; €2 000 001–€15 000 000 by the board of directors on a lapse-of-time basis, in accordance with the bank's Simplification of Procedures for Operations Approval by the board of directors of October 2007; and an amount of more than €15 000 000 by a meeting of the board of directors. The standard AfDB grant agreement document applies for the CBFF.⁶⁴

In addition, disbursement arrangements and reporting procedures are applied within the requirements of AfDB's 'Disbursement handbook'. The disbursements cover all the costs associated with the project, including direct and administrative costs, and are put into effect using one of the following four recognised methods:⁶⁵

- Reimbursement to recipients for eligible expenses already incurred and paid for by the recipient from its own resources
- Reimbursement guarantee whereby the AfDB provides an irrevocable undertaking to reimburse a commercial bank of payments made or to be made to a supplier against a letter of credit (referred to as a 'special commitment' in the general conditions)
- Revolving fund or special account (whereby the AfDB makes an advance disbursement from the grant account to a special account to be used exclusively for the AfDB's share of eligible expenses)
- Direct payment whereby the AfDB, at the recipient's request, pays a designated supplier directly

The first call for CBFF-financed projects was launched in June 2008, with 12 projects qualifying for funding out of 117 submitted proposals.⁶⁶ These projects started operating in 2009. Stichting Nederlandse Vrijwilligers (Netherlands Development Organisation) and PricewaterhouseCoopers have been nominated as the fund management agents. They are both responsible for handling all projects valued between €800 000 and €2,5 million.⁶⁷ According to the Climate Funds Update (2010), of the 17 projects approved, a total of €11,62 million (\$17,42 million) was approved, with €7,81 million (\$11,72 million) already disbursed.

Other funds

The Africa Carbon Support Project has the goal of helping clients to access carbon finance, which will result in the intended investment projects becoming commercially feasible.⁶⁸ Beneficiaries to this fund include the private sector, designated national authorities (dealing with the Kyoto Protocol's CDM) and the CDM community in general. A budget of \$1,8 million has been put aside for a two-year period. The Climate for Development in Africa Fund (ClimDev-Africa) aims to contribute to sustainable development through the implementation of climate-resilient development programmes. Such programmes are similar to those that mainstream climate change into planning. An initial \$135 million was put aside for this fund between 2010 and 2012,⁶⁹ and approved by the AfDB in May 2010. This initiative is subdivided into two initiatives, the first being funded to the tune of \$30 million, in order to strengthen the institutional capacities of four African regional climate centres: the African Centre of Meteorological Applications for Development (ACMAD), the Agro-meteorology and Hydrology Regional Centre (AGRHYMET), the IGAD Climate Prediction and Application Centre (CPAC), and the Drought Monitoring Centre (DMC). This initiative is intended to improve the technical expertise of African climatologists so that they can produce the quality climate data needed to assess climate risk and quantify climatic trends. The second initiative is funded to the tune of \$135 million and is supposed to benefit people in rural communities whose livelihoods are vulnerable to climate change.

In 2010 the Danish government pledged \$56 million towards the Sustainable Energy Fund for Africa (SEFA).⁷⁰ The SEFA will support renewable energy initiatives, and this fund is currently in the process of being established. Another fund under development is the African Carbon Facility (ACF), which will address funding concerns for African countries

in the area of global carbon markets. The ACF's focus is technical and project management assistance for CDM and REDD+ initiatives.

In Cancún in 2010, the AfDB proposed to establish the Africa Green Fund (AGF). This fund will allow African countries to access global funds in order to promote climate-compatible growth and development.⁷¹ The AGF proposes a \$250 million pledge and hopes to be operational by 31 December 2011.⁷² Some proposed project areas to be financed include adaptation, enhanced action on mitigation, technology development, and transfer and capacity building.

The African Water Facility was established by the AfDB in 2004, with the main objective of harnessing increased and appropriate investments required to achieve national and regional water sector targets in Africa. Among the key projects in the water sector are the Lake Chad Sustainable Development Support Programme, which is financed to the tune of \$95 million, the Kandadji Ecosystems Regeneration and the Niger Valley Development Programme, which is financed to the tune of \$62 million.⁷³ Projects in the forestry sector include the \$78 million Farm Income Enhancement and Forest Conservation Project in Uganda. This project aims to re-vegetate 9 900 hectares of degraded watershed, protect 99 000 hectares of natural forests and establish 13 500 hectares of tree plantations.⁷⁴

The AfDB is also involved in GEF activities (AfDB, 2010). The AfDB joined the GEF in November 2003 as an executing agency with direct access to GEF resources and, on an average for every dollar of GEF resources received, has attracted \$4 in co-financing. In addition to this, \$25 million has been secured by AfDB on behalf of its regional member countries.

Conclusion

This chapter addressed the role of MDBs in climate and carbon asset financing in Africa. It focused on the World Bank (by far the largest MDB involved in climate and carbon asset financing, both globally and in Africa) and the African Development Bank. Some of the climate and carbon asset funds considered in this paper included mechanisms from the World Bank: the Climate Investment Fund (incorporating the Clean Technology Fund and the Strategic Climate Fund), the Forest Carbon Partnership Fund and the Prototype Carbon Fund. The Congo Basin Forest Fund, the Africa Carbon Support Project, the ClimDev-Africa Fund, the African Water Facility and the Sustainable Energy Fund for Africa are some of the funding mechanisms considered under the

AfDB. What emerged from this chapter is that a real opportunity exists for Africa in terms of drawing MDB resources to finance climate and carbon asset initiatives. However, there still remains a challenge in that the MDBs' climate and carbon asset finance is still tied to traditional project-approval protocols, fund disbursement and operational procedures, some of which demand substantial amounts of co-funding. For example, one dollar spent on a climate and carbon asset funding from the two MDBs under consideration attracts on average \$6 in co-funding. Such conditions become barriers to the quick uptake of climate and carbon asset financing by potential clients in Africa. Another key factor that emerged in this chapter is that we are likely to see the increasing involvement of MDBs in climate and carbon financing. This follows a call during the G8 Summit in Gleneagles in 2005 for MDBs to take a more active role in this, and the official invitation to have the World Bank as trustee to the proposed Green Climate Fund during the Cancún deliberations in 2010. What has been discussed makes it clear that Africa's share in carbon asset and climate finance is still limited, which may be the result of the conventional arrangements governing loans and concessions by the MDBs. This is why in Cancún, there was a call by the AfDB president to have an African Green Fund established as a mechanism harmonised into the UNFFCCC – though a mechanism that African governments could access more easily. Because donors maintain and safeguard their finances through their voting powers – including the appointment of the president of the World Bank by the US – African governments should continue lobbying for the reform of these institutions. On the same topic, some African countries have had their voting rights withdrawn, a move that presents an additional advantage to the donors in terms of decision making and voting for the allocation and release of climate and carbon asset funds to Africa.

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Financing REDD+ in Africa

Cecilia van Zyl and Godwell Nhamo

Introduction

Reducing emissions from deforestation and forest degradation plus (REDD+) makes developmental, political, social, environmental and economic sense. To this end, the global governance system, national entities and the non-governmental sector (NGOs) have been advocating the institution of a system that will quicken the implementation of REDD+ projects in developing and emerging economies, particularly in Africa. The key issue, however, remains finance. REDD+ projects require significant, non-project-based capacity building, or what is commonly referred to in REDD+ terminology as ‘readiness’ finance.¹ Much of this readiness funding should be raised from public funds and administered through relevant national forestry ministries, departments or agencies. Financing for greenhouse gas (GHG) emission reduction is being mobilised from carbon funds and/or carbon markets, which include both voluntary and compliance markets. The compliance market operates under the Kyoto Protocol² (see also Chapter 5).

Among other factors, REDD+ financing is affected by the taxonomy of forests – this taxonomy includes three broad categories related to the forest transition curve: forest frontiers and disputed areas (marked by heavy deforestation), forest beyond agricultural frontiers (little disturbed) and forest mosaic lands.³ Private REDD+ finance is likely to be secured for forest frontiers and forest mosaic lands. There is a definite

Table 8.1 REDD+ financing requirements

Item	Upfront capacity-building (readiness) costs	Ongoing emission-reduction costs	
		Forest protection costs	Opportunity costs
Objectives	■ Upfront investments in REDD+ infrastructure (monitoring systems, forest and carbon density data), stakeholder participation	■ Implementation of policies and measures that enable and promote REDD+ investments	■ Compensating for lost profits as a result of reducing forest emissions
Features	■ Upfront financing ■ Little direct effect on land use emissions ■ Upfront transaction costs	■ Upfront financing ■ Costs and benefits depend on policy ■ Recurrent transaction costs	■ Upfront financing ■ Continuous financing ■ Costs vary across space and time
Financing needs (examples)	■ Setting up monitoring system (\$ 0.5–2 million in India and Brazil) ■ Setting up forest inventories (\$ 50 million for 25 nations) ■ Capacity-building (\$ 4 billion for 40 nations over five years) ■ Land tenure reform (size-dependent: \$4–20 million over five years for one country based on estimates from Rwanda, Ghana and Solomon Islands)	■ Recurrent costs of forest inventories (\$ 7–17 million per year for 25 countries) ■ Monitoring legal compliance	■ Opportunity costs of halving deforestation (\$7 billion annually over 30 years for eight countries)

Source: Dutschke, M. & Wertz-Kanounnikoff, S., 2009, *Financing REDD: Linking country needs and financing sources*. Bogor: Center for International Forest Research, p. 2

need for public finance from both international and domestic sources for forests beyond agricultural frontiers. Before any REDD+ project can be considered for implementation, there are costs associated with preparing a country to accommodate such projects. REDD+ financing mechanisms can be divided into two principal forms, firstly, capacity-building (readiness) costs and, secondly, ongoing emission-reduction costs (subdivided into forest protection costs and opportunity costs).⁴ A summary of the REDD+ financing requirements is given in Table 8.1.

The main purpose of this chapter is to discuss multilateral REDD+ financing mechanisms available for African projects, bearing in mind that the REDD+ mechanism is regarded as a vehicle with which African governments could significantly contribute to climate change mitigation. Associated with this, the chapter has twin objectives: to determine and profile major multilateral REDD+ financing mechanisms applicable to Africa, and to present the opportunities and risks associated with REDD+ financing mechanisms for Africa and how the continent should engage with REDD+ financing in the future. The data sources used are mainly literature, with online resources, such as the Climate Fund Update, providing the figures used in the tables and graphs.

The chapter is divided into five main sections. The next section addresses the commodification of carbon. This is followed by a section that focuses on REDD+ and global climate negotiation, after which a global overview on climate and REDD+ financing is provided. Finally, REDD+ financing in Africa and the future of REDD+ financing in Africa are discussed.

The Commodification of Carbon

Several carbon markets already exist, such as the European Union's Emissions Trading Scheme (EU-ETS). However, these markets are still somewhat controversial, and many poorer countries complain that their natural resources have been turned into commodities that are traded on exchanges in wealthy countries, and that the poorer countries themselves derive no benefit from these arrangements. If any emission certificates are issued related to a REDD+ project, the trees that absorb the carbon no longer belong to the owners or inhabitants of the land, but to the holders of the emission certificates. A tree that used to be a commodity (i.e. timber) that could be sold has now been turned into another commodity (a carbon credit) that belongs to someone else.

The commodification of carbon has its roots in the Kyoto Protocol of 1997,⁵ which made provisions for the creation of the carbon market.⁶ To

create a market there has to be both supply and demand. In this case, the supply was in the form of permits for emitting carbon and the demand came from 27 industrialised carbon emitters that were allocated quotas to collectively reduce their GHG emissions on average by 5,2 per cent between 2008 and 2012.⁷ A price could thus be set for carbon credits, as for any other commodity. In setting the supply of carbon credits, the cost of creating these credits needs to be considered. These costs have been a major stumbling block in the creation of carbon credits, especially in the case of developing countries:

[T]he question of whether a project leads to additional emissions savings as per the Kyoto Protocol is proving to be a major stumbling block...[I]t is inherently impossible to verify what would have happened in the absence of the project...[E]ven with well-documented projects, the uncertainty in the baseline is at least 45 per cent in either direction...[T]his uncertainty must be managed by putting in place safeguards and taking a conservative approach to minimise overestimation of emission savings.⁸

According to a study by Bosello et al.,⁹ REDD+ projects would be one of the most cost-effective ways to create carbon credits. Introducing REDD+ projects into any carbon credit market would thus effectively reduce the cost of carbon credits in that market and would benefit the companies that have to comply with certain preset carbon standards. To some participants in the carbon credit market this raises certain concerns (e.g. cheaper carbon credits would create less incentive to develop cleaner production methods). Golub et al.¹⁰ demonstrate that the way in which carbon credits arising from REDD+ projects are priced will determine whether the environmental impact of introducing credits arising from such projects will be positive or negative. They suggest that investment in cleaner, less carbon-intensive production methods will not be negatively affected if options to buy carbon credits from REDD+ projects are priced as a derivative of carbon prices. One also has to consider that deforestation has a seriously negative environmental impact, which, at times, is irreversible and leads to a long-term loss of forests that could have been saved. It is essential that REDD+ credits are priced correctly – not only to ensure that deforestation does not take place, but also to ensure that it does not drive carbon credit prices to a level that is too low.

In considering the total economic cost of introducing REDD+ to a carbon credit market, the effect on the market for timber as a commodity

also needs to be considered. REDD+ projects should probably make timber as a commodity scarcer, thus increasing the price. The negative effect of a decrease in the amount of timber that may be sold as a commodity, therefore, can be counteracted by an increase in the price of timber. What is clear is that a model that considers the economic viability of a REDD+ project has to take all of these factors into account. There is support for the development of carbon trading systems in developing countries. Just before the Cancún Climate Conference in December 2010, the World Bank announced that it would help launch ‘a new multi-million dollar fund to support developing [countries’] domestic carbon trading systems.’¹¹

Carbon credits come in two forms: the compliance market (mainly the three Kyoto Protocol market-based mechanisms, which include the Clean Development Mechanism, Joint Implementation and Emissions Trading);¹² and the voluntary market to which the REDD+ belonged until December 2010 (before the Cancún agreements following the 16th Session of the Conference of Parties (COP16)). For stakeholders to be allocated REDD+ carbon credits, a REDD+ project should be certified by one of the key internationally recognised bodies, which include,

Figure 8.1 Clean Development Mechanism and Verified Emissions Reductions processes

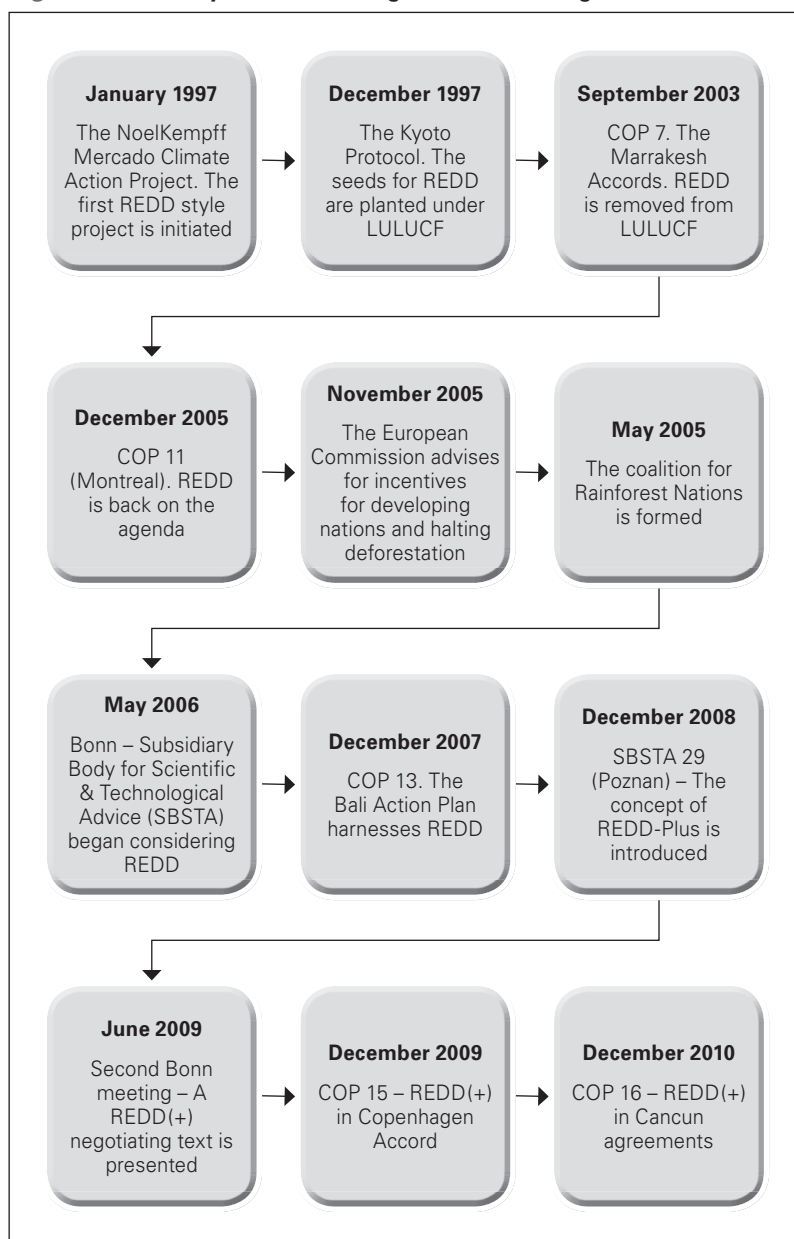
Stages	CDM – Compliance Market	VER – Voluntary market
1	■ Project Intention Note (PIN)	■ Project identification
2	■ Project Design Document (PDD)	■ Feasibility Assessment
3	■ Letter of Approval (LoA) by host country	■ Project Design Document (PDD)
4	■ Validation	■ PDD Validation
5	■ Registration	■ Project implementation
6	■ Verification and certification	■ Verification
7	■ Issuance of carbon creds – CERs	■ Issuance of carbon creds – VERs

among others, the Climate, Community and Biodiversity Alliance (CCBA) standard with registration of carbon credits (known as the Verified Emissions Reductions – VERs) registered with a body like the Voluntary Carbon Standards (VCS).¹³ The VERs can be used in cap-and-trade emission regulations or to offset an organisation's carbon footprint. Internationally, the CCBA and the VCS standards are two of the five commonly used and most reputable carbon offset standards. Other standards include the California Climate Action Registry (CCAR), Gold Standard, Chicago Climate Exchange (CCX) and the Verified Emissions Reduction Plus (VER+).¹⁴ The Clean Development Mechanism (CDM) applies to developing regions, such as Africa. The project cycles and carbon credit validation, certification and issuance processes for the CDM and VERs are shown in Figure 8.1.

REDD+ on Global Climate Negotiations Agenda

Readers need to be familiar with the REDD+ agenda, especially as it features in the UN Framework Convention on Climate Change (UNFCCC). The debates and decisions influence funding, and this section examines these debates and decisions. The REDD+ debates have centred on issues relating to three axes: measuring, reporting and verification (MRV) of changes in forest carbon stocks.¹⁵ Very few countries in Africa have the minimum capacity for MRV and will continue to lag behind for some time, an issue that makes REDD+ implementation difficult. Appropriate remote sensing and geographical information systems need to be put in place for MRV, including REDD+ transactions, which include compensation and financial transactions or transfers. Dutshke and Wertz-Kanounnikoff¹⁶ maintain that monitoring systems focus on estimating human-induced GHG emissions related to forests by source, removal by sinks, forest carbon stocks and changes in the area of forest. A summary of the history of REDD+ in global climate change negotiations and the key decisions taken is shown in Figure 8.2.

According to Hamilton et al.,¹⁷ forestry projects jump-started the global carbon offset market in the early 1990s. During this period, environmental NGOs and industrial companies initiated partnerships to conserve and plant forests aiming at balancing GHGs by capturing carbon in trees. Forestry transactions, however, were sidelined in the international climate negotiating regimes, with only the land use, land-use change and forestry (LULUCF) offsets recognised under the Kyoto Protocol. As of December 2010, many offsets had been developed and purchased purely

Figure 8.2 History of REDD+ and global climate negotiations

Source Modified from Holloway, V. and Giandomenico, E., 2009. *The history of REDD policy*. New York: Carbon Planet, p.4

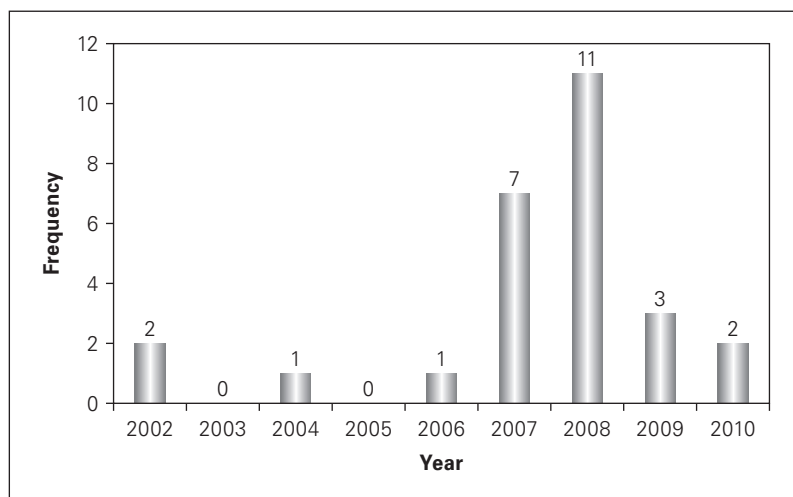
for philanthropic reasons, with a portion of the offsets created as commodity products traded on global regulated and voluntary markets.

Climate and REDD+ Financing: A Global Overview

REDD+ financing falls within the broad categories of both environmental and climate financing. There has been a surge in the number of funds set up to finance the transition to a low-carbon global economy, which include REDD+ initiatives. The trend in the key global climate and REDD+ funding mechanisms established from 2002 to 2010 is shown in Figure 8.3. Two funding mechanisms were announced in 2002, one in 2004 and one in 2006, with none in 2003 and 2005. Seven funding mechanisms were announced in 2007, with peak numbers reported for 2008, when 11 funding mechanisms were announced. The figures then went down to three in 2009 and two in 2010.

Out of the 24 global funding mechanisms for environment and climate change announced since 2002, nine focus specifically on financing REDD+. The funding mechanisms are both multilateral and bilateral, administered through organisations that include the multilateral development banks (MDBs), independent governments, the UNFCCC systems (especially the Global Environment Facility (GEF) and the

Figure 8.3 Establishment of climate funds (2002–2010)



Source Data from Climate Funds Update, 2011, <http://www.climatefundsupdate.org> [Accessed 31 January 2011]

Table 8.2 REDD+ financing details

Fund	Amount pledged	Administered by	Areas of focus	Date operational
GEF (1–5)	\$14,98 billion	GEF	Six thematic areas, including REDD+ addressed under land degradation theme	1991
Congo Basin Forest Fund	\$165 million	African Development Bank	Mitigation (REDD)	2008
Forest Carbon Partnership Facility	\$221,27 million	World Bank	Mitigation (REDD)	2008
Global Climate Change Alliance	\$204,15 million	European Commission	Mitigation (general), adaptation, mitigation (REDD)	2008
International Climate Initiative	\$519 million	Government of Germany	Mitigation (general), adaptation, mitigation (REDD)	2008
UN-REDD Programme	\$87,1 million	UNDP	Mitigation (REDD)	2008
Forest Investment Program	\$512,6 million	World Bank	Mitigation (REDD)	2009

Source: Data from Climate Funds Update, 2011, <http://www.climatefundsupdate.org> [Accessed 31 January 2011]

European Commission). Details of REDD+ finances, administering institutions and operation dates are shown in Table 8.2.

The names of some of the global multilateral funding mechanisms are the Adaptation Fund, Amazon Fund (Fundo Amazônia), Clean Technology Fund, Congo Basin Forest Fund, Forest Carbon Partnership Facility, Forest Investment Programme, Global Environment Facility (GEF) Trust Fund – Climate Change Focal area (GEF 4), GEF Trust Fund – Climate Change Focal area (GEF 5), Global Climate Change Alliance, Global Energy Efficiency and Renewable Energy Fund, Hatoyama Initiative, International

Climate Initiative, International Forest Carbon Initiative, Least Developed Countries Fund, Millennium Development Goals Achievement Fund – Environment and Climate Change thematic window, Pilot Program for Climate Resilience, Scaling-Up Renewable Energy Program for Low Income Countries, Special Climate Change Fund, United Nations-REDD Programme and the Copenhagen Green Climate Fund.

Financing REDD+ in Africa

A number of REDD+ funding mechanisms are in place for use by African governments and other entities. Among them are the GEF, the Congo Basin Forest Fund, the EU-Global Climate Change Alliance, the Forest Carbon Partnership Facility, the UN-REDD Programme, the Copenhagen Green Climate Fund, the REDD+ Partnership and the Forest Investment Programme. Each of the identified funding mechanisms will now be considered in more detail in the following sections.

Global Environment Facility (1991)

Established in 1991 as a pilot trust fund under the World Bank, the GEF is now the most commonly known environmental funding mechanism.¹⁸ The GEF is an independent, international financial mechanism that primarily allocates grants to countries for projects and programmes aimed at protecting the global environment, including those relating to carbon assets.¹⁹ The GEF brings together 180 member governments and international partner institutions (e.g. the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP)),²⁰ NGOs and the private sector, such as the World Bank, in assisting developing countries with environmental projects related to the thematic focus areas. The GEF is funded by multiple donors, including the US. Since its inception in 1991, the GEF has disbursed \$8,8 billion that was supplemented by more than \$38,7 billion in co-financing for more than 2 400 projects in more than 165 countries.²¹

The GEF focuses on six thematic areas: climate change, land degradation, biodiversity, international waters, persistent organic pollutants and ozone depletion. The GEF administers funds for four UN conventions, which include the Convention on Biological Diversity (CBD), UNFCCC, the Stockholm Convention and the United Nations Convention to Combat Desertification (UNCCD). In relation to the focus of this paper, the UNFCCC has the most direct link to carbon asset

financing through GEF. In 2001 the UNFCCC established a Special Climate Change Fund (SCCF) and a Least Developed Country Fund (LDCF), both managed by the GEF.

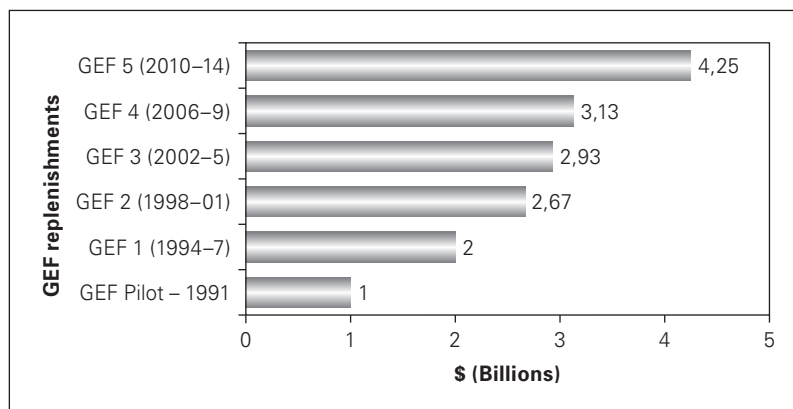
Initially, developing countries were opposed to the institutional arrangement that made the GEF part of the MDBs system, since they believed that a funding mechanism and programme controlled by donors from the developed world through MDBs would not serve their interests. The developing nations wanted a governing structure and a cooperative partnership founded on the UN-style majority-based decision system.²² Eventually, the GEF was restructured in 1994 to address the fears of developing countries. As a result, the GEF moved out of the World Bank as a separate and permanent institution. However, the World Bank took on the provision of the GEF Trust Fund. In terms of procedures, the World Bank administers GEF funding and the UNDP oversees project development, while the UNEP serves as the scientific and technical advisor. The remaining agencies contribute to the management and delivery of projects according to their capabilities and as delegated by the GEF. The funds currently administered by the GEF are summarised in Table 8.3.

Table 8.3 GEF-administered funds

Fund	Type	Areas of focus	Date operational
Least Developed Countries Fund	Multilateral	Adaptation	2002
Special Climate Change Fund	Multilateral	Adaptation	2002
Strategic Priority on Adaptation	Multilateral	Adaptation	2004
GEF Trust Fund – climate change focal area (GEF 4)	Multilateral	Mitigation (general), adaptation	2006
GEF Trust Fund – climate change focal area (GEF 5)	Multilateral	Mitigation (general), adaptation	2010

Source: Based on Climate Funds Update, 2011, <http://www.climatefundsupdate.org> [Accessed 31 January 2011]

Since its inception in 1991, the GEF has financed a number of sustainable forest management projects in Africa. Most recently, the GEF's Incentive Mechanism for Forests has initiated a New REDD+ Multilateral Finance Programme. The key issues remain GEF funding.

Figure 8.4 GEF replenishments (1991–2010)

Source: Based on Lattanzio, R., 2010. *Global Environment Facility (GEF): An overview*. Washington, DC: Congressional Research Service, pp.4, 7

The GEF is financed by multiple donor countries that pledge money after a four-year cycle through a process known as GEF replenishment.²³ To date and since the GEF pilot programme of \$1 billion, there have been four replenishments under GEF 1–4 (see Figure 8.4). Pledges for the fifth replenishment (GEF 5) have been made for implementation in 2010 to 2014. Figure 8.4 shows that GEF funding rose from an initial \$1 billion in the pilot phase to \$3.13 billion in the fourth replenishment phase; the current pledge for GEF 5 is at \$4.25 billion. The US pledged \$575 million for GEF 5. If honoured, this accounts for 13.53 per cent of the total amount. Although the US did not contribute in the pilot phase, it has contributed 13.9 per cent of the GEF 1–4 replenishments. This is a significant amount of money, which may lead to political manipulation (during voting and via decision making). Lattanzio notes that, of the \$4.25 billion pledge made for GEF 5, \$1.3 billion is part of the Fast Start Climate Finance established under the Copenhagen Accord.²⁴

Lattanzio²⁵ further notes three key external challenges for GEF: the rise of climate change issues and financing; the changing role of MDBs in environmental financing; and the increase in new bilateral, multi-lateral and private funding mechanisms. Internal challenges are also noted, which include a lack of strategic approach; slowness in defining the concepts ‘incremental’ and ‘additional’; unsuccessful history of leveraging the private sector; low level of funding by donor countries; and criticism of donor and agency management of the GEF. The GEF has been trying to address some of these concerns, including streamlining

costs and management fees, ensuring project quality at the proposal stage and reducing the length of project pipelines.

Congo Basin Forest Partnership (2002)

The Congo Basin Forest Partnership (CBFP) was launched at the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg. It is a non-binding Type II partnership (meaning it is non-legal and non-binding) registered with the UN Commission on Sustainable Development. The CBFP represents a voluntary multi-stakeholder initiative aimed at promoting the conservation and sustainable management of the Congo Basin's forest ecosystems. One of the CBFP's objectives is to increase the effectiveness of the partners' programmes and initiatives through improved communication and collaboration.²⁶ There are 48 members, including the following groups:

- Governments – Countries that form part of the Central African Forests Commission (COMIFAC), South Africa and several developed countries
- Several international organisations, such as African Development Bank, the UNEP, UNESCO, the World Bank, etc.
- Several NGOs and research groups, such as the African Wildlife Foundation, the Centre for International Forestry Research, WWF International, etc.
- Several private-sector institutions, such as the American Forest and Paper Organisation, Interafrican Association of Forest Industries, etc.

Linked to the CBFP is the Congo Basin Forest Fund (CBFF). Table 8.4 provides a summary of the 15 projects that have been approved by the CBFF after the first call for proposals in 2008. The scope of the projects varies: some are aimed at improving practices in specific industries, some are aimed at capacity building, some are specifically aimed at deforestation and one is aimed at measuring carbon emissions.²⁷ For the second call, which was launched in December 2009 and ended in February 2010, 381 concept notes were received from NGOs and 82 were requested to provide detailed proposals while 40 proposals were received from governments, with 21 chosen to be evaluated for final approval. The total value of the NGO proposals was estimated at \$81 million, and the 21 government proposals at \$78 million. The CBFF was

Table 8.4 Projects and amounts approved by Congo Basin Forest Partnership in first call for proposals

Project	Country/Region	Amount (\$ million)
Achieving conservation and improving livelihoods through the sustainable management of community-based forest operations	Cameroon	1,72
Alternatives to mangrove destruction for women's livelihoods	Central Africa	0,38
Building foundations for success: Community participation is central to REDD	NGO in Belgium to build capacity of NGOs in five central African countries	2,03
Management and innovative sustainable exploitation of forest resources	DRC	1,54
Partnership for the development of community forests	Cameroon	1,79
Phasing out slash-and-burn farming with biochar	DRC	0,47
Promoting community land tenure rights in the Congo Basin	Cameroon, Central African Republic, Gabon, Republic of Congo, DRC	0,73
Quantifying carbon stocks and emissions in the forests of the Congo Basin	Republic of Congo, DRC	1,74
Reforestation of degraded areas and promoting value-addition for non-timber forest products in the Sanaga Maritime Region	Cameroon	0,38
Stabilising carbon emissions in the Sangha Tri-National Forest Complex through sustainable financing and improved livelihoods	Cameroon, Republic of Congo, Central African Republic	0,92
Sankuru Community 'Fair Trade' Carbon Initiative: Innovative management of community-controlled protected areas	DRC	1,83
Reconciling the needs of the logging industry with those of forest-dependent people	Cameroon, Gabon, DRC	1,94
Bonobo Conservation Concession in Equateur Province	DRC	1,71
Working with communities to reduce deforestation and alleviate poverty	DRC	Unknown
Involving Bagyéli indigenous communities in the sustainable management of Campo Ma'an National Park	Cameroon	0,22
Total		17,4

Source: Based on Climate Funds Update, 2011, <http://www.climatefundsupdate.org> [Accessed 31 January 2011]

also considering a joint concept note from COMIFAC, UN-REDD and the Forest Carbon Partnership Facility (FCPF) for a project to improve capacity on MRV of carbon at national and regional levels for the sum of €34 million. At the time of writing (March 2011) it was unclear when the projects approved during the second call would be announced and when the third call for proposals would be made.

The purpose of the CBFF was outlined as follows:

[T]o slow the rate of deforestation by developing the capacity of people and institutions in the Congo Basin countries to manage their forests, and help local communities find livelihoods that are consistent with the conservation of forests.²⁸

The intention at this stage was for the fund to last until 2018 (the African Development Bank (AfDB) agreed to host this fund on request). In February 2008 a conference was organised by the AfDB to discuss funding mechanisms for sustainable management of the Congo Basin forest. In the declaration resulting from this conference, the Central African Government participants stated that they were:

committed to accelerate the ongoing process of putting in place autonomous funding mechanisms for the implementation of the COMIFAC Plan of Action. They made an appeal to all technical and financial partners, in particular the G8 countries, to provide more substantial support to the efforts undertaken for the sustainable management of the Congo Basin forest. They also called upon AfDB to look for new financial resources and invited the World Bank and AfDB to assist COMIFAC member countries in the preparation and mobilization phases of developing carbon credits.²⁹

According to the AfDB, the Chancellor of the Exchequer announced the UK government's intention to contribute funds to a Congo Basin Forest Fund in March 2007. This was to form part of a global Environmental Transformation Fund (ETF), to which a further \$1.5 billion was committed.³⁰ By June 2008, when the CBFF was established, Norway had also contributed a substantial amount, so that the total value of the fund was \$165 million.³¹

In November 2010, the council of the CBFF met to discuss the possibility of establishing a REDD+ MRV programme for the Congo Basin area supported by the CBFF, and what preparation this necessitated.

Individual projects, such as the Sankuru Community Fair Trade Carbon Initiative in the DRC, are already involved or getting ready to be involved in the trade of carbon emissions. One of the aims of this project is to establish one of the first carbon finance mechanisms in central Africa, thereby linking local resource holders and international carbon investors. This way, the project can capitalise on the expanding voluntary carbon market and also prepare for anticipated future inclusion of REDD+ in the compliance market.

EU Global Climate Change Alliance (2007)

In September 2007, the EU Commission launched an initiative on a Global Climate Change Alliance (GCCA).³² The GCCA aimed to step up cooperation and dialogue between the EU and developing countries worst affected by climate change and with the least capacity to react, usually the least developed countries (LDCs) and small island developing states. The GCCA also has as its objectives enhancing dialogue on climate change leading to a post-2012 climate agreement under the UNFCCC that supports convergence of visions between Europe and the most vulnerable developing countries; and enhancing financial support for adaptation and mitigation (where this will help achieve poverty-reduction aims).

Among the five priority areas for funding is REDD.³³ More than 60 per cent of LDCs' emissions originate from land-use change, especially deforestation. Therefore, the GCCA supports innovative solutions to avoid deforestation and builds on existing initiatives, such as Forest Law Enforcement Governance and Trade. In June 2008, the European Commission provided €95 million in additional funds for the GCCA under the Environment and Natural Resources Thematic Programme over the budget period 2008–2010.

An Africa-EU Declaration on Climate Change.³⁴ was put in place in 2008 in Addis Ababa, Ethiopia. This declaration recognised the regional dynamics of the Congo Basin and how they influence the sustainable management of forests. There was an emphasis to the effect that REDD+ negotiations should take this into account. The Climate for Development in Africa initiative and the African Monitoring of the Environment for Sustainable Development programme were noted as having the potential to mainstream climate information into development planning and practices in Africa. It was also noted that the Great

Green Wall for the Sahara Initiative aims at federating African efforts and institutions working on sustainable land management.

Forest Carbon Partnership Facility (2008)

The FCPF started in June 2008 and focuses on REDD+. The FCPF works with tropical and subtropical forest countries to develop the systems and policies for REDD+ and provides them with performance-based payments for emission reductions.³⁵ The FCPF also complements the UNFCCC negotiations on REDD+ by demonstrating how REDD+ can be applied at national level. The FCPF came up with the REDD+ readiness framework that helps nations prepare for systems of financial incentives for REDD+. The REDD+ readiness framework results in participating countries developing reference scenarios, adopting a REDD+ strategy, designing monitoring systems and setting up REDD+ national management arrangements through the involvement of key national stakeholders.

The FCPF governance structure has a 28-member participants' committee elected by the REDD country participants and the financial contributors, six observers nominated by forest-dependent indigenous communities and other forest dwellers, NGOs, various international organisations and the World Bank.³⁶ The World Bank is the trustee for the Readiness Fund; its Carbon Fund provides the secretariat service. The FCPF expects other entities to join the World Bank as delivery partners.

Thirty-seven REDD countries, of which 14 are in Africa, have been selected to be involved in the FCPF. Thirteen of these countries, including the DRC, Ghana, Kenya, the Republic of Congo and Tanzania, have submitted readiness preparation proposals, which were reviewed by ad hoc technical advisory panels and the participants' committee. The World Bank is conducting due diligence on the proposals with a view to entering into readiness grant agreements of up to \$3,6 million to help these countries conduct the preparatory work (excluding Tanzania, which is the recipient of grants from other bodies).

In terms of funding, there are 16 donors: Agence Française de Développement, Australia, Canada, Denmark, the European Union, Finland, Germany, Italy, Japan, The Nature Conservancy, the Netherlands, Norway, Spain, Switzerland, the UK and the US, which, between them, have pledged about \$345 million to the FCPF (\$200 million to the Readiness Fund and \$145 million to the Carbon Fund). It is anticipated that the World Bank's Carbon Fund, which will provide payments for verified emission reductions from REDD+ programmes, will be operational

in the course of 2011 as a public-private partnership.³⁷ The FCPF cooperates closely with other initiatives, such as the UN-REDD Programme and the Forest Investment Program, jointly administered by the MDBs. In 2010, the UK government provided £15 million to the FCPF (of which £10 million is from the Copenhagen Fast Start Climate Finance). The funds are for the development of REDD+ initiatives, the costs of which were already known in at least 37 countries.

UN-REDD Programme (2008)

The UN-REDD Programme is a collaborative partnership between the Food and Agriculture Organization of the United Nations (FAO), the UNDP and the UNEP. Its aim is to reduce emissions from deforestation and forest degradation in developing countries.³⁸ This programme was started in September 2008 with the aim of helping participating countries to prepare and implement national REDD+ strategies. As of 3 January 2010³⁹ the UN-REDD Programme had 29 partner countries from Africa, Asia-Pacific and Latin America, with 12 countries receiving support for national programme activities.⁴⁰ As of January 2011, the UN-REDD Programme had approved a total of \$51.4 million for the nine initial pilot countries and three new countries (Cambodia, the Philippines and the Solomon Islands). These funds help support the development and implementation of national REDD+ strategies. National programmes in seven countries, including the DRC, Tanzania and Zambia, are in their implementation phase. Other African countries are getting involved in the UN-REDD Programme as observers to the programme's policy board and through participation in regional workshops and knowledge sharing facilitated by the programme's interactive online workspace. These countries include the Central African Republic, Kenya, Nigeria, the Republic of Congo and Sudan.

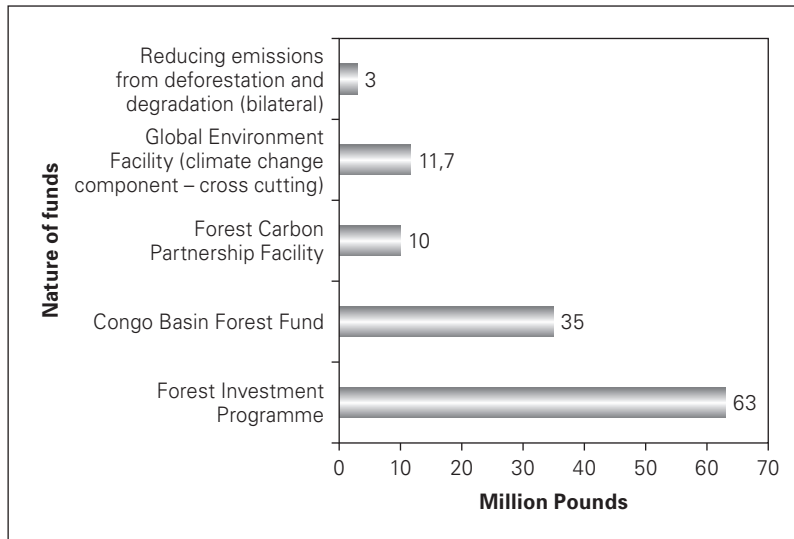
The UN-REDD Programme brings together technical teams to assist in developing analyses and guidelines on issues such as the MRV of carbon emissions and flows, ensuring that forests continue to provide multiple benefits for livelihoods and the environment, and supporting the engagement of indigenous communities and civil society at all stages of the design and implementation of REDD+ strategies. The UN-REDD Programme also seeks to build consensus and knowledge about REDD+ to ensure that a REDD+ mechanism is included in a post-2012 climate change agreement.⁴¹ In terms of financial support,

Norway continues to be the first and largest donor. Since the launch of the UN-REDD Programme in 2008, Norway has committed \$83,2 million for the period 2008–2010.⁴² Denmark is the second largest donor (committing \$8 for the same period). Spain announced its pledge of \$20,2 million at the end of 2009 to 2012 and has so far confirmed \$1,4 million for 2010. The UN-REDD Programme is also actively looking for more donors to meet the increasing demand from countries seeking this form of support.

Copenhagen Green Climate Fund (2009)

The Copenhagen Accord recognised the crucial role of REDD+ and had signatories agreeing on the need to provide positive incentives, including the immediate mobilisation of financial resources.⁴³ In this regard, \$30 billion Fast Start Climate Finance was to be raised by Annex 1 countries in the period 2010–2012, with REDD+ financing being part of the deal. In addition, \$100 billion would be mobilised annually by 2020 to address the needs of developing countries that included REDD+. A significant portion of the proposed funding would be channelled through the Copenhagen Green Climate Fund.

Figure 8.5 UK Fast Start Climate Finance and REDD+



Source based on DECC, 2010. *UK Fast Start Climate Change finance*. London: Department of Energy and Climate Change, p.7

As already highlighted, a number of Annex 1 parties have pledged to support Fast Start Climate Finance, which includes REDD+. The UK government has provided £300 million for activities involving REDD+ with Fast Start Climate Finance for the period 2010–2012. This funding will be used in the areas of national REDD+ strategy development, upfront finance to help implement national REDD+ strategies, and results-based finance for verified emission reductions.⁴⁴ The overall picture of the UK government's commitment to REDD+ with Fast Start Climate Finance for both multilateral and bilateral entities for 2010–2011 is shown in Figure 8.5.

Forest Investment Programme (2009)

The UK government has provided £75 million to the Forest Investment Programme (FIP), of which £63 million is through the Copenhagen Fast Start Climate Finance.⁴⁵ The funds are being used to support at least eight countries in their efforts to implement the investment activities identified in their national REDD+ strategies. The overall objective of FIP is stated as being to support developing countries' REDD efforts, providing upfront bridge financing for readiness reforms and public and private investments identified through national REDD readiness strategy building efforts, while taking into account opportunities to help them adapt to the impacts of climate change on forests and contribute to multiple benefits, such as biodiversity conservation, protection of the rights of indigenous people and local communities, poverty reduction and enhancing the livelihood of rural communities.⁴⁶

The FIP achieves this by providing financing to developing countries for readiness reforms and public and private investments, identified through national REDD+ readiness or equivalent strategies. It is important to note that FIP's purpose is not to provide incentives to reduce GHGs, but to enable pilot countries to leverage such incentives if established under the UNFCCC.⁴⁷ Eight countries form part of the initial pilot programme of the FIP: Brazil, Burkina Faso, the DRC, Ghana, Indonesia, Laos, Mexico and Peru.

The FIP is one of three funds that form the Strategic Climate Fund, which forms part of the larger Climate Investment Funds, all of which are administered by the World Bank. On 30 May 2008, in Potsdam, Germany, the MDBs, several developed and developing countries and other development partners reached an agreement on the design and establishment of the Strategic Climate Fund, and in July 2009 the FIP became operational.

By October 2010, \$511,5 million had been pledged to the FIP, and \$102 million had been deposited. The contributing countries are Australia, Denmark, Japan, Norway, the UK and the US.⁴⁸ Where public-sector funds are involved, the FIP will consider blending products: grants, contingent loans and concessional loans, and guarantee products (loan guarantees and contingent finance). Where private-sector companies are involved, financing products and terms will be developed to address specific programme needs and the point of departure will be that FIP funds:

may be used where the risk/reward profile of initial project entrants are not balanced (i.e. when the investment return on the initial projects do not compensate sponsors for the risks they experience), but where the risk/reward profile for future projects are eventually expected to be sufficient to encourage private investment without future subsidies.⁴⁹

The idea is not to 'crowd out' private investment with FIP, but to 'crowd in' private investment by providing funds to REDD projects that will be viable in the absence of the entry-cost barrier. It is explicitly stated that 'programs should not be approved if they are dependent on a continuous flow of FIP funds'.⁵⁰

REDD+ Partnership (2010)

On 27 May 2010, a REDD+ Partnership was created during the Oslo Climate and Forest Conference. The REDD+ Partnership pulled together 58 partner countries.⁵¹ Of these, 16 are African countries. As of 31 October 2010, there were 71 partner countries.⁵² The REDD+ Partnership is a voluntary, non-legally binding framework and any country wishing to contribute to REDD+ actions is free to join the partnership. The partnership undertook not to pre-judge, but support and contribute to the work on the UNFCCC process with regard to REDD+. Furthermore, this partnership would be replaced by a proper UNFCCC mechanism in the future. The REDD+ partners committed to help put in place a REDD+ mechanism and enable the raising of funds and technical resources from Annex 1 countries so that activities leading to the implementation of REDD+ could be scaled up. The REDD+ Partnership acknowledges the role being played by multilateral and bilateral initiatives on REDD+. ⁵³ In terms of the objectives, the REDD+ Partnership spells out a single objective as the need to:

contribute to the global battle against climate change by serving as an interim platform for the Partners to scale up REDD+ actions and finance, and to that end to take immediate action, including improving the effectiveness, efficiency, transparency and coordination of REDD+ initiatives and financial instruments, to facilitate among other things knowledge transfer, capacity enhancement, mitigation actions and technology development and transfer.⁵⁴

The partnership also seeks to identify drivers of deforestation and forest degradation and the channels required to deal with these. During COP 15, six donor countries pledged to provide funds for the REDD+ Partnership; these funds amounted to \$3,5 billion as initial public finance for the period 2010–2012. This was part of their efforts to contribute towards the Fast Start Finance under the Copenhagen Accord. As of 27 May 2010, the total REDD+ Partnership pledge stood at \$4,0 billion.⁵⁵ By then, the non-Annex 1 developing REDD+ partners were already planning and implementing REDD+ actions, some through south-south cooperation. These partners intended (based on their national circumstances) to:

develop REDD+ strategies, build the required capacity and create the enabling environment for REDD+, establish robust and transparent national monitoring systems, prepare and implement REDD+ actions and demonstration activities, and provide for the full and effective participation of relevant stakeholders, including indigenous communities, local communities and civil society, in the design and implementation of REDD+, and build capacity in this regard.⁵⁶

In terms of governance, the REDD+ Partnership meets regularly at senior official or political level, depending on the issues to be addressed.⁵⁷ There will also be technical-level meetings to address specific issues of concern. The scheduled meetings are co-chaired by one developing and one developed country partner representative. Experiences and expertise will be drawn from the facility management team of the FCPF run by the World Bank and the UN-REDD Programme team, which will provide secretariat services for the REDD+ Partnership. Additional resources to the FCPF and the UN-REDD Programme teams would be provided to them for this purpose. The issues of inclusiveness and transparency that perpetually elude the UNFCCC climate negotiation

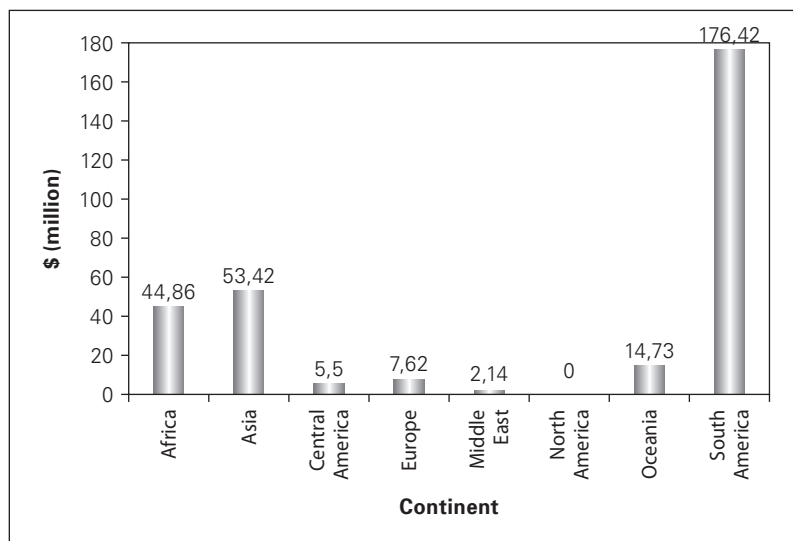
process were considered in the REDD+ Partnership. A conclusion was reached to the effect that the REDD+ Partnership promotes inclusiveness and transparency through the participation of key stakeholder representatives from selected groups. Among such key stakeholders are indigenous people and local communities, civil society and the private sector (who will be involved as observers to the REDD+ Partnership). One of the key landmarks to facilitate transparency was the proposal by the REDD+ Partnership to establish a website.⁵⁸

The Future of Redd+ Financing in Africa

At the UN Climate Change Conference in Cancún, held from 29 November to 10 December 2010, participants reaffirmed that forest loss should be slowed, halted or removed through reforestation and limiting deforestation.⁵⁹ Although it seems that market-based systems may in future be used to finance REDD+ projects, this is not made explicitly clear (mainly because Bolivia was strongly opposed to using market-based systems to finance REDD+ and actually started the talks by asking for market mechanisms to be excluded from REDD+ projects). This issue was on the agenda for further discussion in Durban in 2011.

The creation of a Green Climate Fund was also agreed upon at the Cancún conference. The use of the fund is still to be determined, but it is likely that it would be available to finance REDD+. It was also made clear that while developing countries are expected to establish policies that would encourage REDD+, developed countries are expected to be involved in financing such REDD+ projects. The REDD+ financing and values in terms of global regions are shown in Figure 8.6. Africa takes up a significant share of the REDD+ financing at 14,72 per cent of the total share. The lion's share is taken up by South America, which accounts for 57,9 per cent of total REDD+ allocation, as of 19 January 2011. Asia is second, with 17,53 per cent of the total share.

It is difficult to estimate how much implementing REDD+ will cost in Africa. A study by Hoare et al.⁶⁰ estimates that the start-up cost (or readiness cost) alone may amount to \$13,75 million per country. This means that for the seven African rain-forest countries, where most REDD+ projects may be situated, the total cost could amount to as much as \$96,25 million. However, this cost may have since been reduced, since some countries (e.g. the DRC, Gabon and Cameroon) have several projects up and running, thus proving that some of the initial preparation costs pertaining to infrastructure development, legal requirements

Figure 8.6 REDD+ financing

Source based on Climate Funds Update 2011, <http://www.climatefundsupdate.org>
[Accessed 31 January 2011]

and policy design have already been dealt with. It seems, therefore, that funds needed to cover readiness costs are already available.

Funds are also available to cover certain implementation costs. However, in considering the projects that are financed by the different funds discussed, it is clear that the viability of REDD+ projects is currently greatly improved if the project is linked to the issuing of REDD+ credits (i.e. emission reductions and increases in forest carbon stocks that are measured in tonnes of carbon dioxide equivalence (CO₂e), and which are converted into tradeable carbon units) traded in the voluntary market. In other words, if it becomes possible for REDD+ credits to become part of the compliance market, this will considerably improve the funds available to REDD+ projects. Certainty concerning the future of carbon credits post-2012 will also help to develop a REDD+ credit market.

As indicated in the discussion of the different funds, designing innovative financing methods to finance projects is becoming much more significant as far as the REDD+ agenda is concerned. One possibility worth considering is the issue of forest-backed bonds, whereby future income flows are related to the sale of carbon credits. Forest-backed bonds are capital market instruments created through the securitisation

of future income flows related to sustainable forestry.⁶¹ The study by the Forum for the Future and Enviromarket proposes several models for designing such bonds. One option would be for a government to issue a bond backed by the payment of regular licence fees for the right to develop various opportunities within the portfolio, including the development of carbon projects.⁶² Another possibility would be the issue of a zero coupon bond. Such a bond is issued at a discount to the nominal value. The maturity of the bond could be linked to a future date at which carbon credits may be needed, at which date part of the proceeds for selling the carbon credits could be used to repay bond holders. In both instances the proceeds from the bonds could be used to finance the implementation cost of the forest project. As with any bond, the underlying security and the certainty of the cash flows offered by the bonds are crucial. Ensuring that the regulatory and legal environment is adequate, and that the capacity exists to manage, measure and verify the forests and the carbon emissions are once again key issues that need to be addressed before even considering the issue of such bonds.

Bringing the private financial sector on board would also improve the availability of private finance to REDD+ projects. The UNEP, in collaboration with Standard Bank and the German government's International Climate Initiative, has established the African Carbon Asset Development (ACAD) facility. According to one press release, the purpose of the ACAD facility is to support 'African carbon projects through a combination of technical assistance, grants and preferential access to corporate finance and transactional guidance'.⁶³ The projects that ACAD are working on currently are all concerned with alternative energy projects.

Another issue worth considering is micro-finance. Since REDD+ is not only concerned with reforestation, but also improving the quality of life of communities where the projects are situated, incorporating entrepreneurial activities that fit into the objectives of the REDD+ projects by providing micro-loans to local entrepreneurs may be a particularly viable option. (Communities living within the geographical boundaries of such projects often have to find new forms of livelihood and income generation because their previous ways of earning a living are not in accordance with the conditions of the REDD+ project.) Finance could be provided for activities that correspond to the objectives of the REDD+ programme. These include providing finance for buying implements and raw materials for farming activities that fall within the programme outline, such as harvesting non-timber forest products; the

implementation of strategies to improve yields on existing agricultural land; and the introduction of improved cooking stoves to save fuel wood – and, in many cases, improve the quality of indoor air.⁶⁴ Such an approach is very attractive within the REDD+ framework, not only because it provides a viable finance option, but also because it has the potential to contribute to the objective of improving a community's quality of life. It makes the local communities 'own' the project and should, therefore, help to make the REDD+ project more acceptable.

For markets, return is important, but risk is just as important. Market-based financing of REDD+ will, therefore, favour countries where there are already successful projects, at the expense of poorer countries that are less ready for REDD+. This situation will not necessarily be in the best interests of any project aimed at dealing with climate change, and it is, therefore, important that funding is available to ensure that REDD+ projects are also established in these countries. This is an issue that will have to be addressed by multilateral funds and organisations (e.g. the World Bank and the AfDB).

The Rukinga and Kasigau Wildlife Sanctuary REDD+ project is the first of its kind in Africa. The project was initiated in 1997 by Wildlife Works Inc.⁶⁵ The Rukinga Wildlife Corridor covers 30 000 hectares; the Kasigau Wildlife Corridor consists of approximately 200 000 hectares of dryland forest and savannah grassland. Both habitats serve as an important wildlife corridor between two National Parks (Tsavo East and Tsavo West). Before the institution of the REDD+ project, the local communities depended on subsistence farming, grazing, logging for firewood and charcoal, and hunting.⁶⁶ As a result of this specific REDD+ project, deforestation and reforestation were avoided, thereby safeguarding wildlife movement in the area. In 2009, Nedbank (a South African based bank) signed a carbon-offset agreement with Wildlife Works Inc. that will see millions of dollars being channelled into the project and enable Kenya to acquire the carbon credits for the group's offsetting and for resale to other interested bodies, particularly in South Africa.⁶⁷ The REDD project qualified for an estimated 130 000 annual carbon credits from 2006⁶⁸ to 2026. The 130 000 carbon credits exclude a buffer of 40 000 credits and an estimated 2,5 million tonnes of CO₂e will be realised until 2026. Validation of the project was conducted by an independent verifier, the Scientific Certification Systems, against the Climate, Community and Biodiversity Alliance standard (2nd edition). The project met the 14 required criteria and two additional optional criteria, which meant that it qualified for gold-level status.⁶⁹ The project is

said to be bringing significant benefits to the local communities through education, jobs, environmental protection and direct financial rewards.

Whatever the means of finance, one lesson that has been learned from countries where REDD+ projects have been implemented is that before financial needs are considered, the political situation in the country must be taken into account. It is essential that the political will exists to make REDD+ projects successful before any such project is undertaken. REDD+ projects necessitate a change of behaviour and if there is not adequate will from politicians to ensure that this takes place, any REDD+ project is doomed to fail.

During COP 16, which took place in Cancún, African governments made it clear that they favoured a mechanism that would establish an Africa Green Fund.⁷⁰ African governments also called for the scaling up of funds aimed at REDD+ initiatives to be administered through the AfDB under the Africa Green Fund mechanism. This agenda is being carried forward, and will lead to COP 17 being held in Durban, South Africa, in 2011.

Conclusion

This chapter discussed multilateral REDD+ financing mechanisms with relevance to Africa, including the Global Environment Facility, the EU-Global Climate Change Alliance, the Forest Carbon Partnership Facility, the UN-REDD Programme, the Congo Basin Forest Fund, the Copenhagen Green Climate Fund (including the Fast Start Climate Fund), the REDD+ Partnership and the Forest Investment Programme. It seems that a number of REDD+ projects have already been financed under the different REDD+ funds for African countries, including Cameroon, the Central African Republic, DRC, Gabon, Ghana, Liberia, Republic of Congo, South Africa, Tanzania and Uganda. Among some of the projects are those dealing with the involvement of indigenous communities in sustainable management of national parks, reforestation, sustainable financing for forest stabilisation, readiness preparation, phasing out slash-and-burn practices, reconciling needs of the logging industry with those of forest-dependent people, building forest reserves, promoting community land tenure rights, quantifying carbon stocks and emissions in forests, and conserving wetlands. Politically, Africa is perceived as experiencing challenges associated with weak capacity and bad governance, thereby qualifying as a high-risk investment destination. In addition, there are issues relating to significant

upfront investment in land tenure and improvements in the rule of law and law enforcements. However, as we move into the future, with REDD+ firmly placed on the global climate-change-mitigation agenda, African governments should put in place mechanisms to engage with the mushrooming REDD+ funding mechanism in order to avoid imbalanced investment across the continent. This is an issue that could result in divisions and ‘fights’ for REDD+ foreign direct investment.

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9

Towards climate-compliant trade regimes

The case of South Africa

Godwell Nhamo

Introduction

In October 2009, news reports in South Africa revealed that China had just overtaken the US as South Africa's key export destination. Figures used were for the first half of 2009 (H1 2009). This chapter looks closely at the subject of climate-complaint trade regimes, addressing it holistically for South Africa. Its focus is an analysis of exports, imports and net trade, as well as the manner in which global and national climate-compliant trade regimes in South Africa's export destinations would impact on its trade regime.

China and South Africa both emit significant amounts of greenhouse gases (GHGs), and pressure is mounting to have these and other emerging economies with significant GHG emissions, such as Brazil, India and Mexico, sign up to GHG emission targets. China, South Africa and the UK have ratified the Kyoto Protocol, an international climate change regulatory framework under the United Nations Framework Convention on Climate Change (UNFCCC). Readers are referred to the author's earlier work.¹ The US, on the other hand, has been opposed to the Kyoto Protocol, putting across an argument that emerging economies like China and South Africa be given GHG emission-reduction targets. However, it is critical to note that the refusal by the US to ratify the Kyoto Protocol does not imply ignorance on its part. Several initiatives to reduce GHGs at both the federal and state government levels are

already in place.² A detailed discussion of these and other mechanisms currently in place globally with regard to climate change regulation is outside the scope of this work.

Since President Obama came into office in 2008, there has been a significant move towards joining the global fight against climate change on the part of the US administration.³ The UK, on the other hand, has been a torch bearer and champion in the fight against global warming and climate change. In 2008 the UK became the first country in the world to enact a climate change Act.⁴ Since the world's eyes are now upon China, not only in terms of the huge volume of GHGs it emits, but also in terms of its growth, there is evidence of a move from hostility to partnerships by the developed north, particularly the UK and the EU. Some kind of stick-and-carrot approach has emerged to bring China into the mainstream regarding a need to reduce its GHG emissions. Technology in the fields of clean energy, clean coal and carbon capture and storage (CCS) is being piloted in China with funding from the UK and the EU. These initiatives will influence China, forcing it to change its developmental path to one that is greener and climate-compliant. This will have both direct and indirect implications in terms of China's trading partners. China is now South Africa's largest trading partner in terms of South African exports.⁵ Further details regarding the climate change regulatory regimes of the UK, US, South Africa and China are provided in Section 9.2.

Two research questions are addressed in this chapter. Firstly, what climate change regulatory regimes are in place in China, the UK and the US, and what impact will these have on the future of South Africa's export sector and business? Secondly, what measures can South Africa put in place so as to move closer to a climate-compliant import regime, particularly in response to the three import markets under review? This chapter uses secondary data, presents a literature review, and draws from an audit of climate change regulatory frameworks, particularly from the highlighted trade partners. Secondary trade data for the period 2005 to H1 2009 were retrieved from South Africa's National Department of Trade and Industry (DTI) online database.⁶ Data on carbon emissions were also gathered from the International Energy Agency (IEA) for the periods 1990 and 2005.

This paper focuses on South Africa's three key trade partners. Selection of these trade partners is based on the significant volume of goods and services both exported to and imported from China, the UK and the US by South Africa. In line with the national green economy

agenda spelt out by South Africa, particularly the Long-Term Mitigation Scenario (LTMS),⁷ a call is made for the South African government to put in place a climate-compliant trade regime.

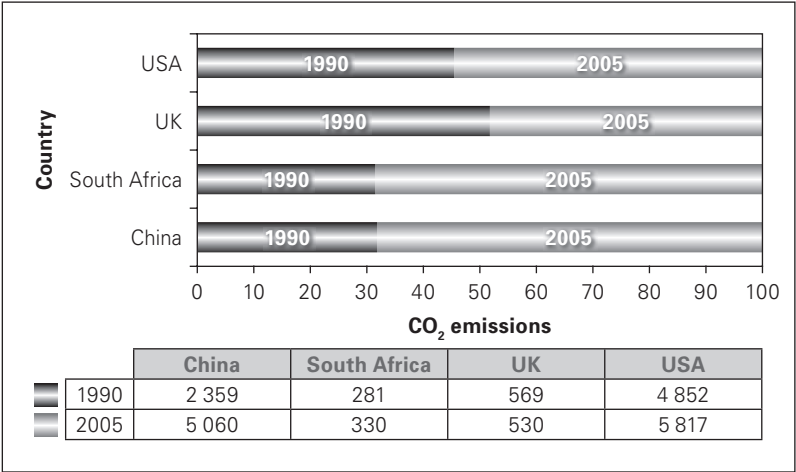
Carbon Emission and Climate Compliance in Case Countries

It is critical to deliberate briefly on GHG emission statistics for the countries under review. While two of the economies under study (the US and the UK) have been given GHG emission quotas under the Kyoto Protocol, China and South Africa have not. Under the Kyoto Protocol, the US and the UK fall under Annex 1 countries – countries that need to collectively reduce their GHG emissions by an average of 5 per cent between 2008 and 2012 based on the 1990 emission levels. Econsense⁸ presents the following details regarding the ratification status and targets set for the countries concerned:

- **China:** Ratified the Kyoto Protocol on 30 August 2002 and is not obliged to take on GHG emission-reduction targets.
- **South Africa:** Ratified the Kyoto Protocol on 31 July 2002 and, similarly, is not obliged to take on GHG emission-reduction targets.
- **UK:** Ratified the Kyoto Protocol on 31 May 2002 and a negative –12,5 per cent GHG emission-reduction target was stipulated.
- **US:** Has not ratified the Kyoto Protocol, although a negative –7,0 per cent GHG emission-reduction target was specified.

Another dimension is the fact that, apart from the UK, the other three countries under investigation are the highest emitters of GHGs in their respective continents (Africa – South Africa, Asia – China and North America – US). The US stood clear of the pack as the highest source and emitter of GHGs. Its total carbon dioxide (CO₂) contribution in 1990 was 4 852 metric tonnes (Mt). Today China stands out as the world's highest GHG emitter, having surpassed the US on 27 August 2008.⁹ The US has to date refused to ratify the Kyoto Protocol, which spells out its targets, and somehow remains 'outside' the post-Kyoto Protocol framework being crafted by the parties and other interested global players leading to the Copenhagen summit. The summary statistics of CO₂ emissions for 1990 and 2005, as compiled from the IEA,¹⁰ are shown in Figure 9.1.

Figure 9.1 CO₂ emissions, 1990 and 2005 (metric tonnes)



Source Data from International Energy Agency, 2008. *International comparison of CO₂ emissions trends and potentials*. Paris: IEA

The scenario discussed above and the picture painted in Figure 9.1 are cause for concern with regard to GHG reduction and trade. The scenario leaves all four countries with an obligation to be climate-compliant, as they have very high CO₂ emission levels. Hence it is going to be a fierce battle both on the local and international fronts. As such, measures have been instituted to regulate a rampant and unchecked GHG production culture. It is interesting to note that the UK's CO₂ emissions were on a reduction path by 2005 (569 Mt of CO₂ in 1990 compared to 530 Mt in 2005). This can be attributed to the leadership in climate compliance shown by the UK. Further deliberations on this are made in the next section. Out of the countries under discussion, South Africa has the lowest level of GHG emissions. This does not necessarily mean that South Africa has been and/or will be treated with kid gloves. In fact, both the US and the UK have joined other developed countries in calling for both China and South Africa to take on emission targets come 2013 when the Kyoto Protocol lapses.

The World Resources Institute (WRI),¹¹ states that in a development that is hardly being noticed by many internationally, China is putting in place a range of domestic energy policies and programmes aimed at significantly reducing its carbon footprint.¹² A summary of climate change regulatory regimes of South Africa's key trade partners is presented in Table 9.1.

Table 9.1 Climate change regulatory regimes in China, UK and US

Country	Climate change regulatory regime
China	■ 2005 and 2008: National renewable energy standard of 15% by 2020 passed ■ 2006: Goal to reduce national energy intensity by 20% by 2010 ■ 2007: China's National Climate Change Programme ■ 2008: National Action Plan on Climate Change ■ 2008: Climate Change White Paper of 2008 ■ 2009: Set of industry, transport and construction energy conservation policies ■ 2009: Premier Wen announced that China will add GHG emission goals to its 12th Five Year Plan starting 2012 ■ 2009: Infrastructure for Green Development Programme – a third of China's global downturn stimulus package to promote energy efficiency ■ 2009: WRI and Climate Change Policy in China Programme ■ 2009: Carbon Capture and Storage Programme ■ 2009: Production of 10kW vertical axis wind turbines launched in October
UK and European Union	UK ■ 2006: UK Climate Change Programme ■ 2006: Initiative on food miles and organic certification ■ 2008: UK Energy White Paper ■ 2008: Climate Change Act ■ 2008: Motor scrappage scheme ■ 2009: Carbon budget ■ 2009: Project 10:10 – UK businesses and other sectors to work towards reducing emissions by 10% by 2010 ■ 2010: CRC Energy Efficiency Scheme (effective April)
	EU ■ 2005: The EU-Emissions Trading System (EU-ETS) ■ 2006: Initiative on food miles and organic certification ■ 2008: December: EU Green Stimulus Package ■ 2009: The EU Directive on Renewable Energies ■ 2009: A target of 20% reduction in GHG emissions by 2020
US	■ 2008: Change in rearguard and climate policy ■ 2009: Clean Energy and Security Act ■ 2009: Climate Bill ■ 2009: Electric Car Fund ■ 2009: Motor scrappage scheme – 316 189 cars turned in in two weeks worth \$1,326 million ■ 2009: Record proxy season see 68 climate change-related shareholder resolutions filed with a 50% success rate ■ 2009: Energy Efficiency and Vehicle Emission Standards (effective 2016) coupled with October declared as the energy-efficiency month for the US

Source Adapted from Nhamo, G., 2009. Climate change: Double edged sword for African trade and development. *International Journal of African Renaissance*, 4(2), pp.117–139

South African Trade with China, UK and US

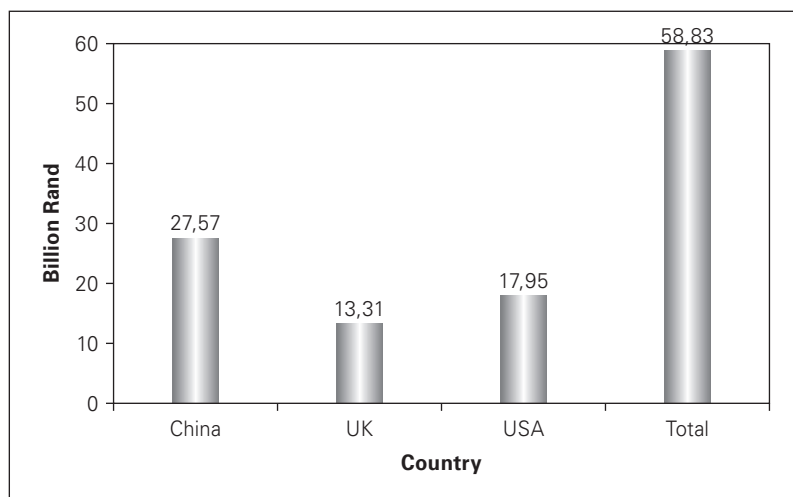
It is important to consider in depth the trade pattern for South Africa with the case countries, China, the UK and the US. Such information and data help us to understand the likely impacts climate change regulatory regimes are likely to have on trade. The discussion is divided into three sections – exports, imports and net trade.

Exports

South Africa's H1 2009 export figures show a strong bias towards China. Of the R58,83 billion worth of exports, China accounted for 46,86 per cent of the total trade value, or R27,57 billion. In second place was the US, with 30,51 per cent of the trade value rounded to R17,95 billion. The UK came in third place with 22,62 per cent of traded value rounded to R13,31 billion (see Figure 9.2).

South Africa's ranked export sectors for 2008 and H1 2009, as retrieved from the DTI and analysed with regard to the three countries under review, are shown in Table 9.2. The Table presents 21 trade sectors, as identified by the DTI. Table 9.2 shows that up to 85,36 per cent of export value in H1 2009 was accounted for by five trade sectors, namely mineral products (ranked first and contributing 33,19 per cent of total

Figure 9.2 Value of exports (H1 2009)



Source Data from <http://apps.thedti.gov.za/econdb/raportt/defaulttrap.asp> (Accessed 15 July 2010)

value exported); natural or cultured pearls, precious or semi-precious (ranked second and contributing 18,06 per cent of value); base metals and articles of base metals (ranked third and taking up 16,98 per cent of value); vehicle, aircraft, vessels and associated transport (ranked fourth and sharing 12,44 per cent of value); and products of the chemical or allied industries (ranked fifth and contributing 4,68 per cent of value). The mineral products sector outweighs all other sectors by far, with 33,19 per cent of total export value for H1 2009.

Further insights reveal that the top 10 trade sectors contributed 96,38 per cent of total export value. Included in this enlarged group are products that have been on the attack in terms of their carbon footprint in the UK and the EU, such as vegetable products (in sixth place and contributing a significant 2,82 per cent of export value); prepared foodstuffs, beverages, spirits and vinegar (seventh and sharing a significant 2,78 per cent of export value). For further analysis regarding rankings and differences between the three countries for H1 2009 and 2008, refer to Table 9.2.

Additional analysis by country presents other dimensions. For example, whereas mineral products exported to China ranked first in both 2008 and H1 2009, the same products ranked second and fifth in the UK, and sixth and fifth in the US. Another observation is that whereas vehicles, aircraft, vessels and associated transport exports ranked second and first for the US in 2008 and H1 2009, they ranked very low for China and the UK. Total export value to China of these products ranked 12th and 11th for the same periods; for the UK market they ranked eighth and ninth.

South African vehicle exports and associated products in the sector to the US ranked first and second in 2008 and H1 2009, respectively. This scenario presents a great challenge to the local export sector, as more stringent carbon regulations will be in place by 2016.¹³ Vehicle manufacturers will be forced to increase fuel efficiency by an average of 6,6 litres per 100 km by 2016. Exhaust emissions will also be regulated for the first time, with a major goal of cutting carbon emissions by 21 per cent by 2030 and reducing dependence on imported oil. This initiative means South African vehicle manufacturers must comply if they intend to retain the US export market. The climate change regulatory regime was expected to cost the US industry an estimated \$60 billion.¹⁴ Vehicles would have to meet a combined average of GHG emissions of 155g/km by 2016.

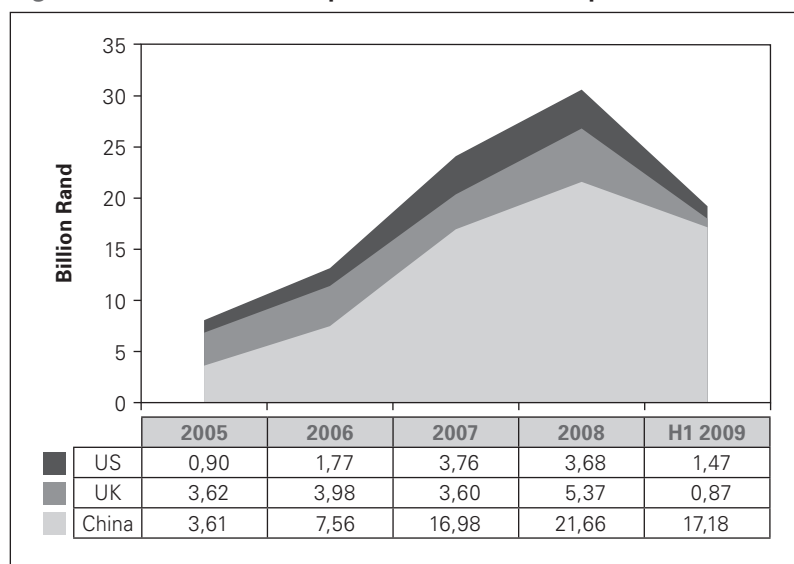
Export trends for mineral products from 2005-H1 2009 are presented in Figure 9.3. Mineral products were ranked 1st in H1 2009. Figure 3 reveals a sharp increase in mineral products exported to China. Overall,

Table 9.2 South Africa's detailed export figures (2008 and H1 2009)

Sector	Rand value China	Rank		
	2009	2009	2008	
Section v: Mineral products	17 184 133	1	1	
Section xiv: Natural or cultured pearls, precious or semi-precious stones	1 119 951	3	3	
Section xv: Base metals and articles of base metal	6 985 077	2	2	
Section xvii: Vehicles, aircraft, vessels and associated transport	51 385	11	12	
Section vi: Products of the chemical or allied industries	467 181	6	4	
Section ii: Vegetable products	8 943	15	15	
Section iv: Prepared foodstuffs; beverages, spirits and vinegar	111 717	9	10	
Section xvi: Machinery and mechanical appliances; electrical equipment	139 740	8	8	
Section x: Pulp of wood or of other fibrous cellulosic materials	406 670	7	7	
Section vii: Plastics and articles thereof; rubber and articles thereof	486 274	4	6	
Section xi: Textiles and textile articles	472 656	5	5	
Section xxii: Other unclassified goods	664	20	16	
Section xviii: Optical, photographic and cinematographic, in measured portions	11 705	13	14	
Section i: Live animals; animal products	14 717	12	13	
Section ix: Wood and articles of wood; wood charcoal; cork and articles of cork	1 577	18	20	
Section xx: Miscellaneous manufactured articles	8 146	16	19	
Section viii: Raw hides and skins, leather, fur skins and articles	79 335	10	11	
Section xiii: Articles of stone, plaster, cement, asbestos, plaster material	9 709	14	17	
Section xxi: Works of art, collectors' pieces and antiques	560	21	9	
Section xii: Footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-stick whips, riding-crops and parts thereof	682	19	21	
Section iii: Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal/vegetable wax	7 579	17	18	
Total	27 568 401			

	Rand value UK	Rank		Rand value US	Rank		Aggregate value	Rank	%
	2009	2009	2008	2009	2009	2008	H1 2009	H1 2009	H1 2009
	874 047	5	2	1 470 089	5	6	19 528 269	1	33,19
	6 005 487	1	1	3 500 197	2	1	10 625 635	2	18,06
	646 284	6	4	2 355 702	3	3	9 987 063	3	16,98
	343 341	9	8	6 926 520	1	2	7 321 246	4	12,44
	424 272	8	9	1 862 548	4	4	2 754 001	5	4,68
	1 470 972	2	5	177 650	8	8	1 657 565	6	2,82
	1 001 202	3	6	525 309	7	7	1 638 228	7	2,78
	999 366	4	3	126 840	6	5	1 265 946	8	2,15
	557 287	7	7	133 444	10	11	1 097 401	9	1,87
	174 242	10	10	164 540	9	9	825 056	10	1,40
	169 454	11	11	106 348	13	10	748 458	11	1,27
	134 343	13	14	100 128	14	18	235 135	12	0,40
	86 164	14	12	130 686	11	13	228 555	13	0,39
	80 826	16	16	123 083	12	12	218 626	14	0,37
	157 992	12	13	8 557	19	20	168 126	15	0,29
	73 847	17	15	80 019	15	15	162 012	16	0,28
	3 169	22	22	74 614	16	14	157 118	17	0,27
	81 734	15	17	29 710	18	17	121 153	18	0,21
	13 980	18	18	45 635	17	16	60 175	19	0,10
	9 347	19	19	6 418	20	21	16 447	20	0,03
	3 733	21	21	1 477	21	22	12 789	21	0,02
	13 311 089			17 949 514			58 829 004		100,00

Source: Data from <http://apps.thedti.gov.za/econdb/raportt/defaulttrap.asp> (Accessed 15 July 2010)

Figure 9.3 South Africa's export trends for mineral products

Source: Data from <http://apps.thedti.gov.za/econdb/raportt/defaulttrap.asp> (Accessed 15 July 2010)

China accounted for R66.99 billion (69,77 per cent) of mineral products export value to the three countries between 2005 to H1 2009. The total value of the exports was R96.01 billion. The remaining percentages for the period 2005 to H1 2009 were shared in the proportions of 18,16 per cent to the UK and 12,07 per cent to the US.

In 2005 South Africa exported R3,61 billion worth of minerals to China and as of H1 2009 the figure stood at R17,18 billion, and will have increased significantly by H2 2009. In 2008 South Africa exported R21,66 billion of mineral products to China. This figure reflects a 600 per cent growth in mineral products exports to this destination since 2005. Although the trend is upward for China, this is not the same for the UK and US export markets. The export value of mineral products to the US has been on a decline since 2007. As of H1 2009, South Africa exported about R1.47 billion worth of mineral products to the US.

Imports

South Africa's H1 2009 import figures once more show a strong bias towards China. Of the R69,07 billion worth of imports, China alone accounted for 51,02 per cent (R35,24 billion rounded) of total value. In

second place was the US, with 33,71 per cent of the import value rounded to R23,29 billion. The UK came in third place with 15,27 per cent of traded value rounded to R10,55 billion (see Figure 9.4).

South Africa's ranked import sectors for 2008 and H1 2009 with regard to the three countries under review are shown in Table 9.3, which presents 23 import sectors, as identified by the DTI. Up to 72,05 per cent of the total import value in H1 2009 was accounted for by five import sectors: machinery, mechanical appliances and electrical equipment (first, contributing 40,42 per cent of import value); products of the chemical or allied industries (second, contributing 9,64 per cent of import value); vehicles, aircraft, vessels and associated transport (third, contributing 8,55 per cent of total import value); textiles and textile articles (fourth and with a portion of 6,93 per cent of total import share); and base metals and articles of base metal (fifth, with a share of 6,51 per cent of total import value). The machinery, mechanical appliances and electrical equipment sector outweighs all other sectors by far in terms of proportion of total import value for H1 2009. The second ranked key import sector (products of the chemical or allied industries) accounts for a much lower 9,64 per cent. Further insights reveal that the top 10 import sectors contributed 89,23 per cent of total import value. For further analysis of rankings and differences between the three countries for 2008 and H1 2009 refer to Table 9.3.

Figure 9.4 South Africa's import values (H1 2009)

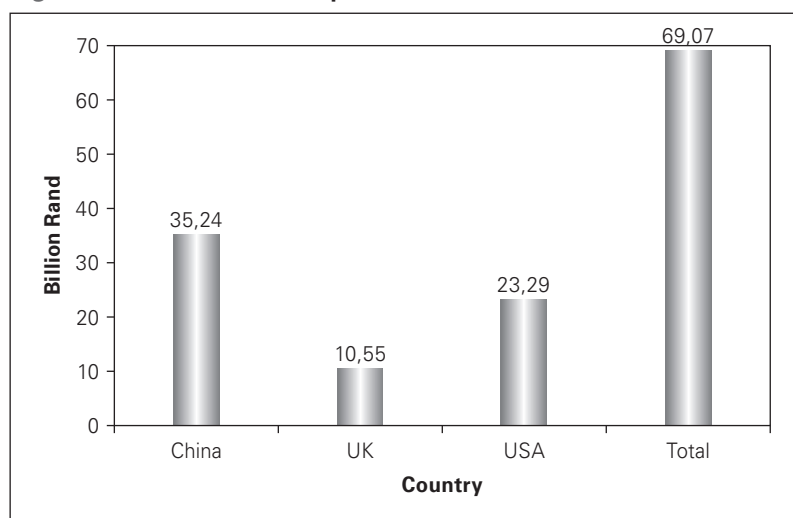
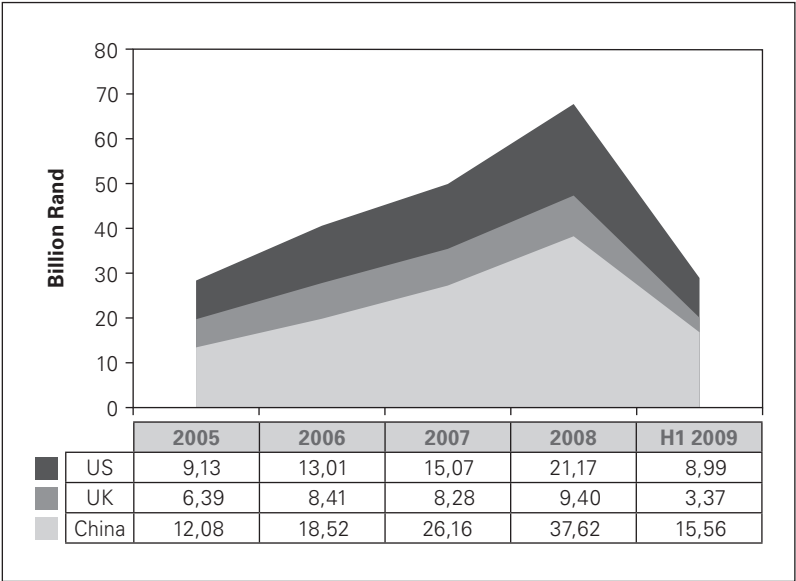


Table 9.3 South Africa's detailed import figures (2008 and H1 2009)

Sector	Rand value China	Rank		
	2009	2009	2008	
Section xvi: Machinery and mechanical appliances; electrical equipment	15 562 242	1	1	
Section vi: Products of the chemical or allied industries	2 038 732	4	4	
Section xvii: Vehicles, aircraft, vessels and associated transport	669 406	9	7	
Section xi: Textiles and textile articles	4 476 889	2	3	
Section xv: Base metals and articles of base metal	3 374 907	3	2	
Section xviii: Optical, photographic and cinematographic in measured portions	618 553	10	11	
Section vii: Plastics and articles thereof; rubber and articles thereof	1 219 970	7	8	
Section xx: Miscellaneous manufactured articles	1 803 831	6	5	
Section xii: Footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-stick whips, riding-crops and parts thereof	1 990 458	5	6	
Section v: Mineral products	305 510	15	9	
Section x: Pulp of wood or of other fibrous cellulosic materials	347 485	14	13	
Section iv: Prepared foodstuffs; beverages, spirits and vinegar	407 130	13	15	
Section xiii: Articles of stone, plaster, cement, asbestos and plaster material	773 952	8	10	
Section xxiii: Special classification provisions: original equipment	174 412	17	17	
Section ii: Vegetable products	507 555	11	14	
Section viii: Raw hides and skins, leather, fur skins and articles	493 910	12	12	
Section i: Live animals; animal products	181 324	16	16	
Section ix: Wood and articles of wood; wood charcoal; cork and cork products	169 322	18	18	
Section xiv: Natural or cultured pearls, precious or semi-precious	110 472	19	19	
Section xxii: Other unclassified goods	3 372	21	21	
Section xxi: Works of art, collectors' pieces and antiques	5 030	20	20	
Section iii: Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal/vegetable wax	2 016	22	22	
Section xix: Arms and ammunition	53	23	23	
Total	35 236 531			

	Rand value UK	Rank		Rand value US	Rank		Aggregate value	Rank	%
	2009	2009	2008	2009	2009	2008	H1 2009	H1 2009	H1 2009
	3 368 390	1	1	8 985 534	1	1	27 916 166	1	40,42
	1 506 348	3	4	3 115 505	3	3	6 660 585	2	9,64
	1 535 649	2	3	3 698 370	2	2	5 903 425	3	8,55
	151 446	11	12	160 637	14	16	4 788 972	4	6,93
	421 180	10	7	700 792	7	8	4 496 879	5	6,51
	511 827	6	8	2 044 817	4	4	3 175 197	6	4,60
	430 128	9	10	896 412	6	7	2 546 510	7	3,69
	115 132	12	14	319 070	12	13	2 238 033	8	3,24
	7 297	21	21	9 632	21	21	2 007 387	9	2,91
	501 331	7	11	1 096 606	5	5	1 903 447	10	2,76
	546 331	5	9	511 141	9	11	1 404 957	11	2,03
	611 707	4	6	327 034	11	12	1 345 871	12	1,95
	94 358	13	13	352 585	10	14	1 220 895	13	1,77
	440 195	8	5	603 220	8	9	1 217 827	14	1,76
	23 169	18	17	206 348	13	10	737 072	15	1,07
	5 602	23	22	7 188	22	22	506 700	16	0,73
	30 736	17	18	77 002	15	15	289 062	17	0,42
	11 207	19	19	58 344	16	17	238 873	18	0,35
	77 598	15	2	32 177	18	6	220 247	19	0,32
	60 012	16	16	45 079	17	20	108 463	20	0,16
	80 354	14	15	15 566	20	19	100 950	21	0,15
	9 582	20	20	23 734	19	18	35 332	22	0,05
	6 309	22	22	3 602	23	23	9 964	23	0,01
	10 545 888			23 290 395			69 072 814		

Figure 9.5 Import trends: Machinery, mechanical appliances and electrical equipment



Further analysis by country reveals additional dimensions. For example, machinery, mechanical, appliances and electrical equipment products were ranked first across the three import markets in both 2008 and H1 2009. However, whereas textiles and textile articles imports ranked second and third for China in 2008 and H1 2009 respectively, this figure differs greatly from those of the UK (ranked 11th and 12th) and the US, where it was ranked even lower at 14th and 16th, respectively. Assuming the Chinese government moves towards regulating the textiles and textile articles export sector for climate compliance, then the impacts will be felt significantly by South Africa, as this is one of the key import sectors. It is likely that there will pressure to move towards organic and other climate-friendly farming practices, which means an increase in production costs. This will, in turn, result in textiles and textile articles exported to South Africa becoming much more expensive. A similar trend is also evident in the footwear, headgear, umbrellas and sun umbrellas sector, ranked as the fifth import sector from China in both 2008 and H1 2009. This sector was ranked very low (21st place) across the reporting period in both the UK and the US.

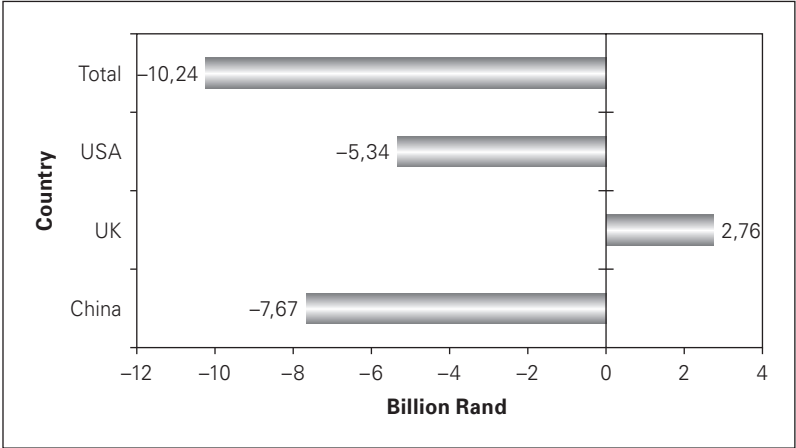
Import trends for machinery, mechanical appliances and electrical equipment from 2005 to H1 2009 are presented in Figure 9.5. The machinery, mechanical appliances and electrical equipment sector was ranked first in H1 2009. Figure 9.5 also reveals a sharp increase in imports for machinery, mechanical appliances and electrical equipment from China. China accounted for R109,94 billion of this sector's import value, or 51,58 per cent of the three countries combined, between 2005 and H1 2009. The total value of the imports was R213,16 billion. The remaining percentages for the period 2005–H1 2009 were 31,60 per cent (US) and 18,82 per cent (UK). In 2008 South Africa imported R37,62 billion worth of machinery, mechanical appliances and electrical equipment from China. This figure reflects a 311,42 per cent growth in machinery, mechanical appliances and electrical equipment imports from China since 2005, when the figure was only R12,08 billion. A similar upward trend is evident with the other two major markets, the UK and the US (see Figure 9.5).

The WRI¹⁵ notes that China's approach in addressing climate change, as spelt out in the National Climate Change Programme, uses a mixture of regulatory instruments. The WRI identifies the use of targets and quotas, industrial and equipment standards, energy taxes, and financial incentives and penalties. It is the application of industrial and equipment standards that will have a significant bearing on South African trade, as this affects both the inward and outward movement of goods traded between the two countries. As the Chinese economy is much bigger than that of South Africa, it is likely to have a great influence in terms of the direction of trade.

Net trade H1 2009

South Africa's net trade for H1 2009 is shown in Figure 9.6. The figures showed a trade deficit with China (–R7,67 billion) and the US (–R5,34 billion); the UK figure was positive. There was also a deficit in terms of total trade for the H1 2009 period (–R10.24 billion). South Africa is a net exporter to the UK, as reflected by the positive figure of R2,76 billion. The top five export product cluster sectors to the UK contributed 77,7 per cent of the total value of R13,32 billion. These cluster sectors – ranked from first to fifth – were natural or cultured pearls, precious or semi-precious (45,10 per cent of total value); vegetable products (11,00 per cent); prepared foodstuffs, beverages, spirits and vinegar (7,50 per cent); machinery, mechanical appliances and electrical equipment (7,50

Figure 9.6 South Africa’s Net trade, H1 2009



per cent); and mineral products (6,60 per cent). The top 10 export product cluster sectors contributed 93,90 per cent. Base metals and articles of base metal (ranked sixth); pulp of wood or of other fibrous cellulosic material (seventh); products of the chemical or allied industries (eighth); vehicles, aircraft, vessels and associated transport (ninth); and plastics and articles thereof, rubber and articles thereof (10th) completed the top 10 export sectors to the UK. Among the export products identified in the top 10 are some that may be negatively affected by both climate change regulatory regimes in the UK and climate change vulnerability in the host country, South Africa. The Food Miles Programme in the UK and EU may have a significant negative impact on vegetable products, prepared foodstuffs, beverages, spirits and vinegar exports because importing such products from South Africa leads to high carbon footprints.

Looking Ahead

The World Bank¹⁶ introduced the concept of taxing virtual carbon and raises the question, should carbon be taxed where it is emitted, or at the point where goods are consumed on the basis of their ‘embodied’ or ‘virtual’ carbon? Virtual carbon is the amount of carbon emitted in producing and delivering a particular good or service. The World Bank reports that many major exporting countries argue that at off-source carbon taxing will penalise them, yet much of the carbon is generated

and emitted during the production process of export goods. China and the Russian Federation are reported by the World Bank as net exporters of virtual carbon; the EU, US and Japan are net importers. Hence, a facility to have countries imposing a carbon tax will be concerned with competitiveness and carbon leakage effects if competing countries do not have similar measures in place. This will result in considerations to tax virtual carbon imports to level the playing field.

The average tariff on imported goods and services if virtual carbon is taxed at \$50 per tonne of CO₂ for the countries under discussion is presented in Table 9.4 in percentage form. The figures indicated are commensurate with emission permits issued in the EU European Emission Trading Scheme. To support the line of argument in this paper, the World Bank concludes that virtual carbon tariff rates faced by emerging economies like South Africa could be significant if the world goes this route. A unilateral imposition of virtual carbon tariffs is highly likely and would be another source of trade friction and wars.

Table 9.4 Average tariffs on imports if virtual carbon is taxed at \$50 per tonne of CO₂

Country		Importing (%)				
		China	EU 15	South Africa	US	Trade-weighted Average (%): Exporting country
Exporting (%)	China	0,00	10,50	11,10	10,30	5,10
	EU 15	1,10	0,00	1,20	1,20	7,63
	South Africa	10,60	9,80	0,00	8,90	7,33
	US	3,10	3,10	3,20	0,00	6,38
	Trade-weighted average (%): Importing country	3,70	5,85	3,88	5,10	N/A

Source: Adapted from Artkinson et al., as cited in World Bank, 2010. *World development report 2010: Development and climate change*. Washington, DC: World Bank, p.263

The last column in Table 9.4 represents the trade-weighted average tariff faced by the exporting country within the grouping and the last row is the trade-weighted average tariff applied by the importing country within the grouping. The EU 15 incorporates the UK. The

trade-weighted average tariff faced by South Africa when exporting to China, the EU and the US will be 7,33 per cent and 10,60 per cent if exporting to China. Likewise, the trade-weighted average tariff applied by South Africa when importing from China, the EU and the US will be 3,88 per cent (and 11,10 per cent if importing from China).

In his speech to the UN Secretary General's High Level Summit on Climate Change, which focused on building bridges for a new climate deal agreement post-2012, South African President Jacob Zuma raised key issues. The meeting took place on 22 September 2009 in New York. President Zuma mentioned that there was a need to move swiftly and ensure there would be a new climate treaty. However, he cautioned:

The global agreement should be guided by a shared vision. It should be inclusive, fair and effective. It must recognise that solving the climate problem cannot be separated from the struggle to eradicate poverty...On mitigation, the agreement must contain ambitious, quantified, and legally binding emission reduction commitments by developed countries. It must set the framework for mitigation actions by developing countries that are supported and enabled by finance and technology...Our goal should be to significantly reduce emissions across the globe without constraining development in the countries of the South.¹⁷

It is the last part of President Zuma's speech that is most profound in terms of what this paper hopes to achieve. Stringent climate change regulatory regimes in key South African trade partners will certainly have implications for both the export and import markets, as well as net trade. If not adequately checked, the bias will always remain against South Africa, particularly the exports. Hence, climate change regulatory regimes should still leave room for development and poverty eradication, especially from the perspective of an emerging economy like South Africa.

In her speech during South African Carbon Capture and Storage Conference on 29 September 2009, Energy Minister Dipuo Peters reiterated the views of the president. However, she added that government was in full support of the CCS technology as a transitional mechanism to move towards a low-carbon South Africa.¹⁸ Diverging from her prepared speech, Minister Peters challenged participants to be the biblical Noahs of our times and make a difference by doing what is right. The first workshop organised by the Department of Energy under Peters'

ministry to discuss building blocks and a road map to CCS regulation in South Africa took place in Midrand on 30 September 2009.

The stage is set for a low-carbon global economy. As one of the emerging global leaders and players, South Africa must play ball or else the country's solid development path will be curtailed if a trade regime that is climate-compliant is not put in place. Such a trade regime must focus on both the export and import markets. Although the greatest challenge will be from the UK (including its EU trade bloc) and the US, China is likely to follow suit as more and more global pressure is exerted, especially from the developed north for it to move towards a low-carbon economy. As discussed earlier, some of South Africa's top exports, especially to the UK, include products that are exposed to both a stringent climate change regulatory regime and a vulnerable physical local landscape.

South Africa needs to move with others in making sure that the catch-up game is in place. There is no doubt that the three case countries are more advanced in terms of addressing the need to transform to greener, low-carbon entities. Even if the Copenhagen round of climate negotiations fails to come up with a strong post-2012 framework, individual countries that are trade partners to South Africa, including those from the south, like Brazil, India and Mexico, will be putting in place significant climate-compliant regimes.

It would be hypocritical not to acknowledge the great work and progress made by South Africa in the face of the global climate change challenge so far. The framework and political will to migrate to a green South Africa is in place. What remains is to awaken some of the policies in place. The LTMS, for example, identifies a need to move towards a green economy as well as develop CCS technology and deploy it. The environmental tax reform is another initiative currently running. The Energy Efficient Accord¹⁹ and the Carbon Disclosure Project²⁰ are two landmark voluntary climate regulatory regimes that have been put in place by business. The challenge that still remains in this arena is that there has not been a united climate change voice from business associations in South Africa. Some of the key national climate change regulatory regimes since 1996 are listed in the box below – Climate change regulatory regimes and initiatives in South Africa.

However, the insights raised by both President Jacob Zuma and his minister for energy, Dipuo Peters, remain valid, as discussed earlier. South Africa and other emerging economies need to address climate change issues in a manner that does not compromise and curtail

Climate change regulatory regimes and initiatives in South Africa

- 2011: Hosting of the UNFCCC 17th Session of the Conference of Parties and the Eighth Session of the Meeting of Parties under the Kyoto Protocol
- 2011: State of the Nation Address and Budget Statement
- 2011: Completion of phase II of the Gautrain rapid rail system (O.R. Tambo International Airport to Pretoria)
- 2010: Completion of phase I of the Gautrain rapid rail system (Sandton to O.R. Tambo International Airport)
- 2010: Green Economy Summit
- 2010: National Climate Change Response Strategy Green Paper
- 2010: Carbon Tax Green Paper
- 2010: Industry Policy Action Plan II (IPAP II)
- 2010: Integrated Resources Plan (2010–2030)
- 2010: Atlases – wind, carbon capture and storage and vulnerability
- 2010: New Growth Path
- 2010: Integration of the climate change criteria in the JSE Socially Responsible Investment Index (JSE SRI)
- 2010: Launch of the Water Disclosure Project
- 2010: Launch of the King III Report
- 2009: FIFA 2010 Green Goal Proposal
- 2009: Wind atlas for South Africa (in preparation)
- 2009: National solar water heating strategic framework
- 2009: Regulations on carbon capture and storage (exploratory work underway)
- 2009: Draft Taxations Laws Amendment Bill 2009
- 2009: National statement following the Second National Climate Change Summit
- 2009: Renewable energy feed-in tariff (REFIT) Regulations
- 2008: National Energy Act
- 2007: Long-Term Mitigation Strategy passed
- 2007: Carbon Disclosure Project launch
- 2007: National statement following the First National Climate Change Summit
- 2006: Framework to support environmental fiscal reform in South Africa
- 2005: First National Climate Change Summit
- 2005: Energy efficiency strategy
- 2005: Sustainable development criteria for clean development mechanism projects
- 2004: Establishment of designated national authority under the Kyoto Protocol framework
- 2004: Regulations for the establishment of the designated national authority
- 2004: National climate change response strategy
- 2004: White Paper on the Promotion of Renewable Energy
- 2002: Ratification of the Kyoto Protocol to the UNFCCC
- 1997: Ratification of the UNFCCC
- 1996: Constitution of South Africa

development, poverty eradication and job creation. Hence, the principle of common but differentiated responsibilities and capabilities remains a pillar. South Africa must also be in the forefront of CCS technology, leading to its deployment in the country. This is a measure that will go a long way in reducing the carbon footprint of many export products using dirty electricity generated from carbon-heavy fossil fuels.

Energy efficiency and carbon disclosure must be made mandatory so as to operationalise some of the policies already in place, like the LTMS. The South African business community is also challenged to continue the good work in terms of engaging initiatives, including energy efficiency and carbon disclosure. The green jobs proposal and strategy currently in the pipeline must be finalised without delay. This proposal has great potential to stir the economy to greater heights in terms of climate compliance.

Conclusions

This chapter addressed the need for African economies to have climate-compliant trade regimes through the South African case study. The top three South African trade partners (China, the UK and the US) were purposively identified on the basis of their volume of trade with South Africa. The work revealed that a range of climate change regulatory regimes has emerged from these South African trade partners. It also emerged that even if China does not eventually accept (mandatory) targets in terms of GHG emission reduction in 2013, countries from the developed north, especially the UK, EU and US, have been engaging with China with the single goal of reducing its huge carbon footprint. The study noted that global pressure to coerce China into reducing emissions will have spillover effects, as China will, in turn, force its key trading partners, like South Africa, to do likewise. Although many still believe China is not doing enough voluntarily to curtail its emissions, reports from that country show a great movement towards a low-carbon economy. The other remaining key trade partners to South Africa, particularly the UK and the EU trade bloc, were indicated as being significantly further ahead in terms of climate compliance. The new US administration has also joined the global movement to reduce emissions and has put in place stringent vehicle emissions and efficiency regulatory regimes effective from 2016. Another aspect discussed in the chapter is climate-change-related tariffs that are very much biased against South Africa. Therefore, this chapter acts as a warning and wake-up

call to South African business, especially the export sector and decision makers, to be proactive and work towards a low-carbon trade regime. The chapter also acknowledged that South Africa has done well and is moving at a relatively fast pace towards a climate-compliant economy. Some of the key climate change regulatory policies identified include the Long-Term Mitigation Scenario and ongoing work looking at the national climate change response strategy, environmental fiscal reform strategy and the green jobs strategy. South Africa should also move swiftly towards instituting a climate-compliant import regime.

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Carbon taxation in the context of environmental decay and climate change

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Introduction

The role that carbon taxes play as an interventionist tool in mitigating the effects of climate change is uncertain. The reasons are that implementation of such taxes is relatively recent, and they also compete with other environmental policy measures. In an ongoing 'battle', carbon taxes have to compete against various other policy measures. This chapter describes the existing and potential role of carbon taxes in an uncertain world and specifically in Africa.

The discussion is structured as follows: Firstly the theoretical basis for carbon taxes is discussed. The next section compares market-based interventionist policy measures (of which carbon taxes form part) with decentralised and command-and-control policies, and then compares carbon taxes and marketable permits (which are both market-based interventionist policy measures) are compared. Experiences with carbon taxes in a few selected countries are subsequently discussed. An overview of the welfare aspects of a carbon tax is then provided, followed by discussions on the topic of environmental control cost and border adjustment. Finally, a conclusion is made.

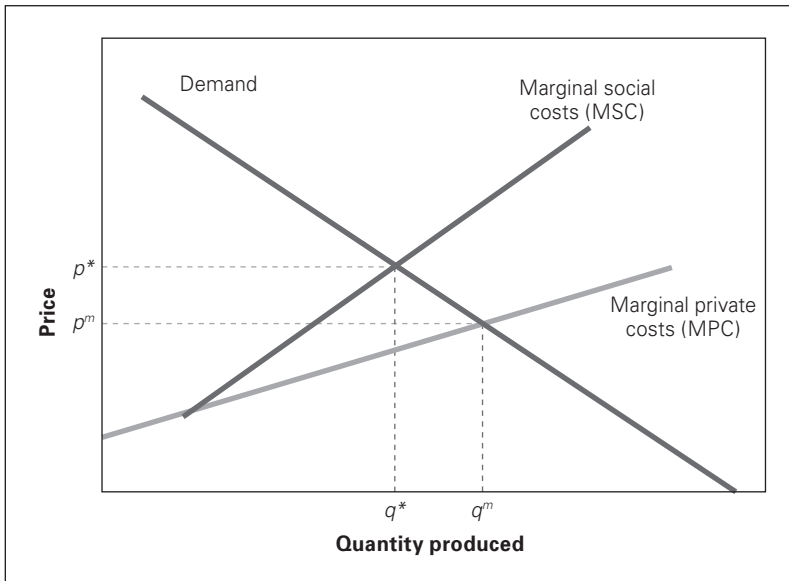
Economic Approach to Climate Change

The Kyoto Protocol (see Section 10.4.1), whereby countries were set targets to decrease greenhouse gas (GHG) emissions, stimulated new

interest in environmental taxes in general and carbon taxes specifically. Environmental taxes are one of three general policy options available to governments in their attempt to counteract environmental damage that results from pollution. These policy options are based on the premise that in any economic transaction the equilibrium price that was determined by market demand and supply does not mirror the real, or 'correct', cost for the market participants. Due to this misalignment between the equilibrium price and the actual price that market participants are supposed to pay, externalities (positive or negative) exist and government intervention is needed to rectify these distorted market forces. The role of markets is to allocate resources. Therefore, intervention is needed to prevent the misallocation of resources.

The existence of externalities and the resultant government intervention were described by Pigou in 1920 and led to the now familiar, so-called Pigouvian tax.¹ Pigou's exposition can be explained by the representation in Figure 10.1.

Figure 10.1 Pigouvian tax



In a perfectly competitive economy the marginal willingness to pay (the demand) will be equal to the MSC (the supply). The equilibrium price (p^*) and quantity demanded (q^*) exhibit a socially efficient allocation

of resources or socially efficient production and consumption. Social welfare is, therefore, maximised at these points.

The stock of GHG emissions is an externality that is long term in nature. Although the elasticity of the demand and supply curves will change and these curves will shift over time,² this socially efficient allocation of resources incorporates both the short and long term. In this equilibrium the current and future use of resources in the natural environment are, therefore, discounted.

In an imperfectly competitive economy, the equilibrium price and quantity do not incorporate all the marginal costs for the market participants. The resources used from the natural environment are not measured in monetary terms and, therefore, they do not form part of the market mechanism. This implies that when the MSC is calculated they are excluded, as illustrated in Figure 10.1.

Subtracting these costs (of the resources used) from the MSC, gives the MPC. From a socially efficient point the equilibrium price and quantity (p^m and q^m in Figure 10.1) are, therefore, not the 'correct' utility and profit maximisation equilibrium for the consumer and producer. However, this equilibrium price and quantity are efficient in terms of private efficiency. The market economy, in its imperfect (and realistic) form, does not lead, therefore, to social efficiency and social welfare.

This problem of negative externalities can be rectified, at least from a purely theoretical angle, by certain institutional and interventionist policy measures. The purpose of these measures would be to close the discrepancy between the MSC and the MPC. In Pigouvian terms, the existence of market failure in the form of a negative externality requires state intervention. However, state intervention poses certain problems. On the role of the government, Demsetz comments:³

In response to the inefficiencies that he sees, Pigou turns to the State to levy taxes or confer subsidies that result in equality between private and social cost. His manner of doing this idealizes the State, which somehow knows the facts and is able to employ them at less cost than could private parties. He writes of idealized State-directed solutions to the problems that...are likely to have been caused by the State itself.

The Stern Review⁴ calls climate change the 'greatest and widest-ranging' market failure we have ever seen. Market failures arise when a number of assumptions on which the perfect (market) economic model is based

are not met in reality.⁵ The most important of these (in terms of climate change) are the lack of clearly defined property rights and the lack of full information on the real costs of production and consumption.

As climate change is a public good, (non-rival and non-excludable) property rights are not clearly defined. The nature of climate change as an international public good is clear from the negotiations between the developed and developing countries on environmental matters (for example, the Copenhagen Accord in 2009⁶). As it is (nearly) impossible to define such property rights, the cost of climate change cannot be internalised in the consumption and production activities of the individual participants in the international market economy. Even if property rights of GHG emissions were clearly defined, international environmental negotiations take place around (national) vested interest, which goes beyond environmental issues, such as international trade issues. The Coase solution, whereby voluntary negotiations to internalise externalities take place with clearly defined property rights, without transaction costs and independently of the initial allocation of these property rights, is impracticable.⁷

The assumption of the availability of full information for market participants presents problems in two ways. The first is the extent of this information, and the second, the nature of this information.

The extent of the information refers to whether it is fully available or partially available. Behaviour in the real world suggests that rational market participants attain social efficiency by acting appropriately to or reasonably in a given situation. This is what Langlois⁸ calls 'situational behaviour'; Simon⁹ portrays it as the 'existence of a satisfactory alternative'. The satisfactory alternative is (socially), efficient although there is a lack of information. Regarding the lack of information, Demsetz¹⁰ states that '...there exists an efficient amount of ignorance in an economic system if the cost of acquiring information is positive'. Therefore, given the information available on climate change, participants in the (international) market system can be expected to act appropriately to the current consequences of climate change. However, many economists still consider the available information as inadequate for efficient economic decision making.¹¹

The nature of the information available poses another problem. At issue here is the anthropocentric determination of these mentioned social costs. ('Anthropocentric' is a term commonly used in environmental economics to describe the tendency of human beings to regard themselves as the central and most significant entities in the universe.) In

the neoclassical world the social costs are determined by human needs alone. This is partly in contrast to other perspectives on the role of the environment, such as the ecological approach and policies for sustainable development.¹² A typical example of this human-needs approach is where Lomborg argues in the *Skeptical environmentalist* that the 'environmental problems' are overstated, as there have been vast improvements made, among others, in the natural environment.¹³ Whether institutional or interventionist methods are used to address the discrepancy between MSC and MPC, it is important to at least determine the extent of this discrepancy in monetary terms (from the neoclassical perspective).

Despite vast improvements in the quality and quantity of scientific knowledge on the natural environment and climate change, the precise role which the natural environment plays still escapes the body of existing human knowledge.¹⁴ As climate change is a long-run externality, uncertainty about the outcome of this change is high.¹⁵

The problem of a lack of knowledge for devising policy measures is partly solved by the precautionary principle¹⁶ in the ecological perspective and the setting of 'safe minimum standards' in policies for sustainable development.¹⁷ The irreversibility of human impacts on the environment and the lack of knowledge give way to an overstatement of the environmental problem, rather than an effort to 'precisely' quantify the problem. An overstatement of the environmental problem leads to excessive corrective action, which in itself is not a socially efficient allocation of resources. This, however, is regarded as preferable because of the irreversibility of human impacts on the environment and the lack of knowledge.

The ecological perspective considers human existence as a subsector on an equal footing with the natural environment. The latter consists among others, of the botanical subsector and the animal subsector. Together all these subsectors make the earthly existence possible. To place a monetary value on the natural environment is impossible, as the role that this sector plays is indeterminable. As noted by Perman et al.:¹⁸

Almost all economists are intellectually committed to the idea that the things people want can be valued in dollars and cents. If this is true, and things such as clean air, stable sea levels, tropical forests and species diversity can be valued that way, then environmental issues submit – or so it is argued – quite readily to the disciplines of economic analysis...most environmentalists not only disagree with this idea, they find it morally deplorable.

Policies for sustainable development are based on biophysical limits, issues such as fairness and equity, technological choices and uncertainty.¹⁹ Together with the ecological perspective these must be seen as complementary to the anthropocentric approach in that they accentuate irreversibility and uncertainty.

Institutional and Interventionist Policy Measures: The African Context

Policy measures to correct the mentioned market failure consist of those that are based on certain institutions in a community and others where intervention from government is required. The menu of policy alternatives available ranges from nearly non-intervention from government to those that require extensive intervention.

Institutional policy measures are based on the existence or non-existence of certain institutions in a community that could facilitate movement towards social efficiency and social welfare. Institutions, as defined by North,²⁰ are ‘...regularities in repetitive interactions among individuals. They provide a framework within which people have some confidence as to how outcomes will be determined.’ And ‘they entail enforcement either of the self-enforcing variety, through codes of behaviour, or by third-party policing and monitoring’.

A transferable, enforceable and well-defined property rights regime is an institution where market participants will capture all the social values associated with the use of an environmental resource.²¹ A properly functioning property-rights regime is a practice that develops over time.²² The prerequisites for such a regime are clearly defined property rights and a market for all goods. The problems in developing countries, such as Africa, are that property rights are poorly defined and markets are also poorly developed.²³

This leads to the lack of a second possible institutional intervention, namely voluntary action (or bargaining). Such action is where individuals and firms engage in pollution-control measures without other forms of intervention. This is not possible where property rights are not clearly defined or there is a lack of markets. Furthermore, the lack of a properly functioning legal system makes institutional intervention difficult. A legal system with the enforcement of liability laws creates avenues for market participants to internalise external costs.

The lack of intervention possibilities is aggravated by the nature of climate change, namely that it is an international public good and its

impact is long term. As stated by North (see earlier quote) it is possible for governments (the third party) to intervene with policing and monitoring. The challenge for Africa is that institutional development takes time and governments in Africa are inherently unstable. Institutions are fostered in stable socio-political environments where there is certainty of outcome. The uncertainty of outcomes inherent in the environmental problem of climate change aggravates the problem for Africa

Where institutional intervention is decentralised by nature, meaning that the market will determine the social costs, the use of environmental standards requires the opposite, in that it is a command-and-control interventionist measure. The assumption in this case is that the market cannot determine the social cost of environmental degradation. The market is substituted by governments that determine the social costs and internalise the externality by setting an environmental standard (in Figure 10.1 this is shown as the gap between the MSC and the MPC).

Environmental standards take the form of input standards (the use of specific inputs), the type of technology used in production output standards (the type of product or emissions) and emission licences.²⁴ The popularity of standards is based on the assumption that they are simple and direct. However, standards are a rigid interventionist instrument that lost their popularity due to, among other things, high costs of (imperfect) compliance.²⁵ Standards do not stimulate the use of environment-friendly technology²⁶ and there is the above-mentioned lack of information to design an appropriate level for the standard.

Standards, however still have a role to play, such as where extremely dangerous products are involved. Also, standards can be complementary to the mentioned institutionalist approach or to market-based interventionist policies.

Standards were the dominant method of reducing pollution in most countries. However, given the rigidity of standards (and lack of realism) and an international preference for market-based policies since the 1980s, interventionist policies tend to set up rules and then leave it to the market mechanism to adapt to cost-effective pollution-control procedures and technologies.²⁷

Incentive-based policies consist of charges (environmental taxes) and subsidies, and transferable discharge permits (or carbon permits). The rest of this chapter will focus on environmental taxes.

The idea, as proposed by Pigou, is that by using taxes the market participant uses information, which governments do not have, to internalise the social cost of the negative externality. Referring to Figure 10.1,

the externality will be internalised by bringing the MPC in line with the MSC. In a perfectly competitive economy the purpose of social efficiency will be served. Even if social efficiency is not reached, incentive-based environmental policies prove to be preferable. According to Baumol,²⁸ ‘...a persuasive case can be made for the use of taxes and subsidies to control externalities, even if they will not produce an optimal allocation of resources in the complex world of reality’. However, Baumol also acknowledges the fact that in reality we do not know the extent of the social costs involved,²⁹ but that setting the level of the pollutant through trial and error at a satisfactory level is better than nothing.³⁰

The ‘superiority’ of incentive-based policies, such as the case with taxes, is that an individual or a firm can adjust to taxes through the market mechanism to attain efficiency. This is possible because knowledge about their private efficiency is available, something governments do not have. Taxes then internalise the externality and the market mechanism (competition) is used as the vehicle to force market participants to adjust their consumption and production, which will result in social efficiency. The market mechanism leads to the equalisation of marginal abatement cost across firms. This allows firms to reach the aggregate emission target at the lowest possible cost (known as the equimarginal principle).³¹ Under a regime of standards this will also be possible, but only if emissions are set for each individual firm, something which is virtually impossible given the inherent uniformity approach of standards policy regimes. Taxes are not set for each individual market participant. Environmental taxes also have the additional benefit of the ‘double dividend’ benefits. In other words, the tax system generates revenue that can be used to decrease other types of taxes and to address its primary focus, namely to contain the emission of GHGs.³²

The role of taxes in Africa varies and many explanations can be forwarded for these variations. According to Mkandawire, the general level and structure of taxes in Africa are determined by three political economy factors: state capacity, the extent of the formalisation of the economy (how big is the informal sector compared to the formal sector) and levels of income inequality.³³ For the purposes of this chapter, the following observation of Mkandawire is important: greater tax collection is possible in countries where colonial institutions were in place at independence.

The general tendency concerning institutional and interventionist policy measures is that market-based measures are preferable. However, as with many policy measures, there is not necessarily only one correct measure, and policy measures may be complementary.

Carbon Taxes and Marketable Permits: A Comparison

The difference between carbon taxes and marketable carbon permits is that with a carbon tax the price of emitting CO₂ is fixed and known, and the market will then determine the quantity. In the case of marketable carbon permits, the quantity is determined beforehand and the price is then determined in the market by demand and the fixed supply.

Therefore, the advantage of carbon taxes is that there is no uncertainty concerning the price. However, if economies are in an upward phase, robust and growing, there is a good chance that such a tax would not affect the amount of carbon that is transmitted. The advantage of a system where marketable carbon permits are used is that the amount of carbon can be restricted to a level that would limit environmental damage. However, the two systems are not necessarily mutually exclusive; it may be possible to use a little bit of both to manage environmental problems. The rest of this section compares some characteristics of both systems and highlights the advantages and disadvantages of each.³⁴

In considering the two systems, the ultimate objective should be kept in mind. There may be advantages or disadvantages to a particular system, but the overriding criteria should be to what extent environmental damage will be contained. Also, in choosing between the two options, the possibility of the double dividend of a carbon tax should be kept in mind: limiting GHG emissions while at the same time using the income generated from the tax to reduce other types of taxes.

Reducing the quantity of emissions

As mentioned previously, the difference between a carbon permit and a carbon tax is that in the first the quantity of emissions is fixed by the amount of permits issued, and the price of these emissions are then decided in the market. There is thus an upper limit on the decrease in the amount of carbon emissions, which is determined by the amount of carbon credits that were issued. In the case of a carbon tax, there is no such upper limit – emissions will continue to decrease as long as the cost of decreasing the emissions is less than the tax that needs to be paid on additional carbon emissions. The level of emissions that will be curtailed by the tax is, therefore, uncertain – it may be lower than the desired amount, but there is no upper limit.

If we look at the way in which the Kyoto Protocol is structured, Annex 1 countries (i.e. a country that agreed to a certain level of reduction in carbon emissions under the Kyoto Protocol) can create additional carbon credit units that can count towards meeting their Kyoto targets through the Joint Implementation (JI) mechanism and/or the Clean Development Mechanism (CDM).

Under the JI, defined in Article 6 of the Kyoto Protocol,³⁵ a country with an emission reduction or limitation commitment (Annex 1 Party) is allowed to earn emission reduction units (ERUs) from an *emission-reduction or emission removal project in another Annex 1 Party*, each equivalent to one tonne of CO₂, which can be counted towards meeting its Kyoto target. Under the CDM, defined in Article 12 of the Protocol, a country with an emission-reduction or emission-limitation commitment (Annex 1 Party) is allowed to implement an emission-reduction project in developing countries (non-Annex 1 Party). Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets. A system where carbon credits are traded does not, therefore, necessarily place an upper limit on the amount of carbon emissions that can be traded.

The creation of additional credits does, however, come with its own set of advantages, disadvantages and other aspects to consider. Reducing emissions from deforestation and forest degradation plus (REDD+) projects would now be able to qualify as JI or CDM projects, and these are discussed in more detail in Chapter 8. However, what is important here is that because additional credits can be created ensures that there is no upper limit on the decrease in carbon that can be facilitated through the current Kyoto Protocol structures. Unlike in the case of a carbon tax, there is a lower limit, i.e. a minimum amount that has to be reached.

Flow of revenue funds to government and other parties

Carbon taxes have the potential to generate a steady flow of funds to the government. In the short run it may be difficult for firms to adjust to the implementation of such taxes, but after a while, if the cost of decreasing carbon emissions is less than the carbon taxes, production and production processes may be adapted so that less tax may be received from this source. This happened, for example, in Denmark.

However, there are several aspects that need to be considered. Firstly, will the introduction of such taxes be an additional tax or will it be used

to decrease other types of taxes, as indicated in the experience of some European countries? If carbon taxes create an additional tax burden, this will not be to the advantage of the economy. The way in which funds collected from such taxes are used will also have economic welfare effects which are discussed later.

When tradeable permits are issued at a price, government will receive a once-off payment. Therefore, this will not create a steady flow of income to the government. Experience has shown that tradeable permits are mostly, however, not sold but 'grandfathered' (i.e. provided to the companies emitting them for free on the basis of their current emissions and the amount by which they have to decrease emissions, see Chapter 6). As will be discussed in Section 10.6, this means that there is no possibility of substitution of revenue (e.g. to decrease income taxes) and this will, in the short term, result in a decrease in total welfare. In the long term, once the welfare benefits arising from a decrease in environmental damage grow, this situation may be reversed. However, such benefits are much more difficult to measure accurately.

In the case of marketable carbon permits, profits can be made. If a company has carbon permits in its portfolio that it does not need, it can sell them, and should prices be favourable, it may be able to make a profit. In a growing economy this may be a possibility, as the increase in production will probably lead to an increase in the demand for carbon credits, pushing up their prices. How the profits from selling these credits are used has implications for carbon emissions. If profits are used to increase consumption or non-environment-related investment, it is likely that the resultant increase in demand may lead to an increase in production and an increase in carbon emissions.

With a carbon tax it is easier to track the use of revenue. If revenue is used for environmental mitigation purposes (i.e. decreasing carbon emissions or investment in new environment-friendly technology to ensure more carbon-effective production processes), it would benefit the environment. Such behaviour will probably be from an environmentally responsible firm, and it is likely that profits from such activities may be directed towards decreasing emissions even more.

Cost

If a tax is introduced there are several costs involved. These include the cost of designing the new tax, the means of collection and creating systems to ensure compliance. However, most countries have a

well-established tax system and a new tax would, therefore, not normally place a great burden on the economy. Since a carbon tax is an indirect tax, it should be relatively easy to administer.

In the case of a marketable permit, the costs incurred will include costs for the development of trading systems, measuring, reporting and verification/compliance systems. As there will be profit opportunities, the market will provide the trading systems. It will, however, be necessary to regulate these markets and these costs will have to be incurred by the government. In addition, marketable permits will be needed by a specific company. To this end, it will be necessary to administer the amount of credits that each company needs and the amount owned by it. These costs would probably need to be carried by government. It is highly likely, therefore, that the cost of introducing a marketable permit system would be a greater burden to government than a carbon tax.

These costs are only implementation costs and not the total economic costs. With the total economic costs, if a firm reduces emissions with tradeable permits, it will be able to sell permit credits to other firms, maybe at a profit. With carbon taxes a firm pays less tax; there is no profit to be made.

Marginal cost of reducing carbon emissions to the firm

Cheaper options to reduce carbon emissions will always be used first. Using current production technology more efficiently will be the cheapest option to reduce carbon emissions. Developing new technology to decrease emissions further will in the short run be more expensive, but once the new technology is in place the cost again should come down over the long term.

Firms will only introduce new technology to reduce emissions if the marginal cost per unit is lower than the carbon tax per unit. Therefore, as it becomes necessary to introduce new, more expensive technology, it may be necessary to increase the carbon tax. Increasing a tax is a politically unpopular option which may be met with resistance.

With marketable permits, firms will introduce more efficient technology that emits less carbon if the cost of introducing the new technology is less than the cost of the carbon permits. Therefore, at the stage when current technology is used more efficiently to decrease emissions, the price of carbon credits will also become lower, as there would be less demand for the permits. With new, more expensive technology the demand for permits should increase and subsequently also the price of

the permits. Consequently, the higher price of carbon permits makes the more expensive technology a viable option.

Therefore, if we only consider how the marginal cost of reducing emissions will affect the decision to employ more efficient technology, a marketable credit system looks like a better option. However, this will only be to the advantage of the environment if the price of carbon credits is at such a level that it makes economic sense for companies to improve technology. The design of the structure of the market is of utmost importance. Bosello et al. warn, for example, that introducing REDD+ projects into any carbon credit market would effectively reduce the cost of carbon credits in that market and would create less incentive to develop cleaner production methods (see Chapter 8).³⁶

Stability of system

The carbon credit price has important implications for the effectiveness of the system. A stable price will limit uncertainty. Parry and Pizer point out that price volatility may have a negative effect on the development of new technology:³⁷

Price volatility in allowance markets may in turn deter both long-term capital and R&D investments in low carbon technologies that have high up-front costs. The long term payoffs of making such investments will be very uncertain if the future price of CO₂ is unknown.

The variation in the price of the Euro Union Admission Allowance has been discussed at length in Chapter 6.

With a carbon tax, the possibility of a change in the level of the tax exists, but generally governments steer away from unexpected tax changes. Therefore, if we only consider stability, a carbon tax would be preferable, as this will limit uncertainty.

Aldy, Ley and Parry³⁸ suggest that a 'Climate Fed' may be established 'that could counteract severe price volatility through buying or selling allowances to the market in times of unusually high or low prices'. It could have more roles:

One could consider a variety of tools at the disposal of the Climate Fed, such as relaxing emission caps, reallocating caps by borrowing emissions from future periods to augment current period

allowance allocations, or increasing the amount of offsets that would be allowed into the cap-and-trade regime.

Such an institution would be able to add stability to a potentially unstable carbon credit market.

Permanency of the system

Given the discussion until now, it is possible that carbon taxes may be done away with. Experience shows that synergy between the tax systems of different countries is very difficult to attain. A permit system can operate on the national level (or lower regional level), but as climate change is currently enjoying international attention, it is likely that such a system will be established on an international basis, and once introduced, it will be difficult to abandon it. As mentioned before, the costs of establishing such a system are also very high. Because the market mechanism will play a bigger role, incentives for market participation will be higher as profits are to be made. All these factors will contribute to making it more difficult to abandon such a permit system.

Transfer of carbon-producing investment activities

For a carbon tax system to be effective, a globally consistent carbon tax system is needed. If there is not one, carbon-intensive activities may merely relocate from countries introducing the carbon tax. There are, however, measures that may be used to mitigate this effect, such as border tax adjustments, which are discussed in Section 10.7. In the case of a permit system, permits are allocated on a firm basis. If the permits system operates globally, relocation of a carbon-producing firm to another country will serve no benefit.

Summary:

Carbon taxes versus a system of marketable carbon credits

In considering the various implications of using a carbon tax as opposed to a marketable carbon permits, it becomes clear that both systems have advantages and disadvantages. When faced with designing an emission mitigation scheme, the specific circumstances of the region where such measures are being considered will have to be taken into account and analysed. Although there is a substantial body of studies available on

the effect of carbon tax, fewer are available that compare the two systems, especially in developing economies. One should also remember that it may not be necessary to choose between the two options because it is possible to have a system that combines carbon taxes with carbon permits, in which case the art would lie in selecting the most appropriate mix of the two systems.

Experiences with Carbon Tax in Selected Countries

The following overview is not an extensive list of environmental taxes, or more specifically carbon taxes. As the appropriateness of carbon taxes, in comparison to an extensive range of environmental taxes is not clear (see, for example, the experience of the Netherlands, discussed later in this section), up-to-date information is not readily available. It is also not precisely clear what the role of carbon permits will be in comparison with carbon taxes. There is still ongoing institutional development in this area. For example, the European Union Emission Trading Scheme only started in January 2005.

In terms of its environmental purpose, there should be no difference between a carbon tax and carbon permits. If polluters pay for permits (or the carbon tax) the environmental outcome will be the same. Mackenzie explains this as follows:³⁹

Thus, if the relationship between emission levels and the carbon price is known with certainty, either a cap-and-trade market or a correctly set tax can achieve a required level of abatement, and the necessary tax rate will be the same as the allowance price... However, economists' analyses suggest ways of designing a carbon market that might make it and a tax more closely equivalent in practice. These include rules facilitating the 'banking' of permits for future use and the 'borrowing' of permits from future years, regulated perhaps by an adjustable requirement for firms to hold a certain amount of permits in reserve, analogous to the adjustable reserves that banks are required to hold.

Although carbon taxes, in theory at least, are considered to be superior to carbon-permit trading,⁴⁰ practical implementation favours carbon permits. Whereas carbon permits have a prescribed quantity as a basis, a carbon tax uses prices, and from a perspective of acceptableness,

carbon permits become an environment issue and carbon taxes a tax issue. Also, taxes require unanimity whereas carbon permits do not. In terms of the implementation of international tax structures, such as the EU or Southern African Development Community, the refusal of one country can limit implementation of such a tax. Such implementation problems prohibited the implementation of a Europe-wide carbon tax in the 1990s owing to criticism from industry interest groups and certain countries.⁴¹

Due to factors such as high population and urbanisation rates, a lack of energy infrastructure and a need to increase the government revenue base, the implementation of environmental taxes, especially carbon taxes, in developing countries, like most economies in Africa, should be considered as a viable policy option.⁴² The situation in Africa fluctuates between countries indicating that some are willing to participate in implementing carbon taxes, whereas others see their contribution to GHG emission targeting as insignificant. The latter is, for example, the approach of Nigeria. While the intention in Nigeria is to establish a National Climate Change Commission as a statutory body with the responsibility to regulate, co-ordinate policies and action plans on climate change in addition to setting up a national carbon market scheme, these efforts are not expected to have a large effect on total GHG emissions.⁴³

...[E]ven if all of Nigeria's efforts went into battling environmental issues and climate change, it will have a very minimal impact on the global environment and climate change around the world because it contributes little to greenhouse gas emissions relative to other countries...From previous actions of more developed nations, Nigeria has little incentive to diverge from its existing development path because there lacks firm commitment from nations like China and the United States of America.

This seems a 'reasonable' argument if one considers the estimates from the African Development Bank:⁴⁴ Africa's energy production is about 9.5 per cent of the world's total output (including 12.1 per cent of the world's crude oil production; 6.6 per cent of natural gas output; 4.7 per cent of the world's hard coal; and 3.1 per cent of hydroelectric power). Africa only has 3.6 per cent of global oil-refining capacity; generates only 3.1 per cent of the world's electricity; and consumes only 9.0 per cent of its total oil production, exporting the rest. Its share of world

energy consumption is only 3,0 per cent compared to its 14,0 per cent share of the world's population.

However, climate change is an international public good that requires complete international participation. Where economic reality is usually undermined by political decision making and processes, this problem of 'relative guilt' will be determined on the international political field. Africa has to take responsibility for its continuous lack of institutional capability, which is the underlying reason for its lukewarm attitude to climate change.

The attitude of Nigeria is, however, not a generalised view attributable to Africa. Another view is that of, for example, the government of Uganda, which accepts that change is needed, stating:⁴⁵

As Uganda moves towards a market economy and private sector led growth, it requires market based tools to enlist private sector participation in environmental management and enhance efficiency in the use of environmental resources. Green taxes, green accounting, and the polluter-pays principle are the order of the day and there will be greater emphasis on reducing, reusing and recycling.

This is also the case in South Africa, which announced willingness to undertake nationally appropriate mitigation actions to decrease GHG emissions by 34,0 per cent by 2020 and 42,0 per cent by 2025. However, '(t)he announcement was conditional on the availability of adequate, predictable levels of funding to support these actions, technology transfer and capacity building efforts by developed countries'.⁴⁶ The reference to capacity building is an acknowledgement of the lack of institutional capacity in South Africa – one of the more developed countries in Africa.

In South Africa an electricity levy of 2c/kWh was implemented in July 2009 as a step towards developing a comprehensive carbon-pricing regime. Tax incentives, and specifically targeted government programmes for renewable energy and energy-efficiency measures, form part of the South African government's policy response to climate change. A carbon tax on new vehicle CO₂ emissions was also implemented on 1 September 2010.⁴⁷ This is a further step to streamline the existing tax system towards more environmental taxes. Environmental taxes will not be earmarked, but will be used to lower other forms of taxation.

According to the United Nations Environment Programme (UNEP), the Zimbabwean government introduced a carbon tax as of 1 January 1 2001.⁴⁸ The tax is calculated according to the engine capacity of motor

vehicles and in 2004 the average tax on a light passenger car was \$5 per year. It is also interesting to note that it was envisaged that funds from this carbon tax would help the establishment of an environmental fund to facilitate environmental management, including air pollution projects.

Tanzania used primarily command-and-control measures such as standards. It seems that although the intention was to use market-based instruments, such as carbon taxes, a major problem is the inefficiency of the current tax system. A lack of clarity, uniformity and transparency characterised the tax system.⁴⁹ This does not favour the use of carbon permits.

The role of carbon taxes in Africa is mostly overshadowed by the development of the carbon permit markets. For example, although the Kenyan government envisaged a vehicle emission tax, as in South Africa, the environmental policy design is focused on the development of carbon markets.⁵⁰ African countries cannot be blamed for this situation. The selling of CER credits (permits) to developed countries was precisely developed to help developed countries mitigate climate change cost-effectively. A market solution is thereby offered to overcome the problems associated with a lack of institutional capacity in African countries. This solution to the problem to climate change will, however, still be dependent on funding from the developed world for institutional capacity building in Africa.

India is in a similar position to Africa. Its contribution to GHG emissions globally is minor, but because of its growing population its emissions are large and fast growing.⁵¹ India shares the African perspective on climate change, namely that ‘...significant responsibility for [climate change] clearly does not lie with India or other developing countries...’⁵² This perspective is further qualified by referring to ‘differential responsibilities’. India mostly depends on environmental standards, and the intention is to broaden its base by targeting standards in a more scientific way. According to the National Action Plan on Climate Change, published in 2008, the intention is to implement some form of emissions tax.⁵³ This was realised in 2010, when coal producers were taxed at 50 rupees per metric tonne to help fund clean-energy projects.⁵⁴ As coal, which was providing 47,6 per cent of energy needs in 2005,⁵⁵ is generally cheaper than other forms of renewable energy sources in India, such a tax will adjust the relative prices of these energy sources.

China is another country that plays an important role in the total stock of GHG emissions. The National People’s Parliament of China introduced

environmental legislation on water and air quality in 1979. The institutional system of governance, which is highly decentralised, makes the implementation of environmental control extremely variable.⁵⁶ This limits the effectiveness of environmental policy, based on standards, voluntarily persuasion and the closing down of production facilities. In general, the priority in China has been economic growth and not environmental damage control.⁵⁷ Although studies indicate that the implementation of a carbon tax in China will limit GHG emissions, such carbon taxes are, like in most developing countries, not yet implemented. It seems, however, that the intention by government is to implement such taxes in the future.⁵⁸ Overall, there seems to be a shift in China's view regarding the environment with more legislation having been put in place.

The previous discussion of developing countries indicates a general non-use of carbon taxes. This is due to the problems of differential responsibility between the developed and developing world, early stages of the implementation of general environmental control measures and a lack of institutional capacity. As noted in the opening paragraphs, carbon taxes must compete against other environmental policies due to implementation problems.

In the developed world the implementation of carbon taxes is also somewhat eclectic. Countries within the EU were the first to implement carbon taxes on a country-specific basis. In the decade up to 2008, GHG emissions in the 27 EU member countries decreased by 2,4 per cent. The areas where emissions decreased were energy use, waste, manufacturing and construction, and agriculture. At the same time, however, emissions from the energy industries, industrial processes and transport were growing.⁵⁹ It is difficult to isolate the effect of carbon taxes in the EU during this time, because the carbon permit market in the EU also started to operate during this period.

According to Stavins, by 1999, six European countries – Denmark, Finland (the first in 1990), Italy, the Netherlands, Norway and Sweden – implemented some form of carbon tax.⁶⁰ Carbon taxes were combined with other forms of environmental taxes and the purposes were to contain environmental damage and tax income generation. This differs between countries and changed over time.⁶¹ Concerning the latter, for example, carbon-based tax in Finland was later changed to a combination with an energy content tax in a 60 : 40 ratio.

Denmark combined a carbon tax, introduced in 1992, with energy taxes. The existing energy taxes were lowered with the introduction of the carbon tax. These two taxes have both an incentive and revenue-generating

effect. This double dividend benefit of the carbon tax is also applicable in Norway and Sweden. Among the Scandinavian countries, Denmark's approach of combining a carbon tax with subsidies for energy efficiency appears to have had the best results.⁶² An increase in energy taxes led to a decrease in income tax since 2001. In 2011 the Danish government released a new energy strategy. The purpose, among others, is to reduce fossil fuel emissions by 80 per cent to 95 per cent in 2050. This will be done by supply side measures: increasing the use of renewable energy sources by 33 per cent in 2020; research and development on non-fossil fuel energies; scrapping of subsidies on fossil usage; and substituting fossil tax revenue with supply side revenues.⁶³ Given these policies, as carbon emissions decrease the revenue and role of carbon taxes will decrease.

Sweden set its tax according to the average carbon content of the fuel and introduced it in 1991. The income from this tax was used to cover budget deficits and lower income tax. In Norway a carbon tax was introduced on mineral oil in 1991. This was later extended to all fossil fuels, but because of EU rules, coal and coke were exempt in 2003 and offshore installations in 2008.

Although the energy tax structure in the Netherlands is comprehensive, it lacks a well-focused strategy for environmental preservation.⁶⁴ A fuel tax was introduced in 1988 and a regulatory energy tax in 1996. Tax revenue from energy tax nearly doubled (it was 8,8 per cent of total tax revenue in 2002). Although these taxes were originally based on a 50/50 distribution between energy and carbon, the carbon tax element became negligible.⁶⁵ The revenue from the fuel tax was considered to be ordinary tax income, substituting personal and corporate income tax. The regulatory energy tax was used on subsidies to increase energy efficiency and reduce CO₂ emissions. The general problem with the carbon tax in the Netherlands to 2002 was due to the previously mentioned random development of the general tax system over time. The better use of the carbon-emission characteristics of energy sources will improve the regulatory power of the tax system. However, indications were that this was not going to happen.

The voluntary GHG emission system in the US (which did not ratify the Kyoto Protocol) is a decentralised system based on sub-national state control. Various state initiatives are ongoing. Also in Australia (which ratified the Kyoto Protocol late, in 2008), sub-national efforts for limiting GHG emissions have started. However, the indications are that efforts in both these countries are primarily towards systems of tradeable permits and not the use of carbon taxes.⁶⁶

From the discussion above, firstly, it is clear that the role of carbon taxes is not a major policy instrument in most countries' environmental policies. Secondly, carbon taxes are used in a complementary way to other taxes and, lastly, how carbon taxes will be used in the future is not clear.

Welfare Aspects of a Carbon Tax

The welfare effects of a carbon tax on consumers depend on three main factors:

- The increase in prices of products affected by the carbon tax
- The way in which the revenue from the taxes is used
- The resultant decrease in carbon emissions

Shackleton et al.⁶⁷ explain that if revenue from carbon taxes is used to offset other types of distorting taxes, for example, taxes on savings or taxes on labour, this could lead to a more effective tax system, and thus increase total welfare of the community. If revenue from carbon tax is used to reduce taxes on savings or investment, this may lead to higher capital formation. This way, the decrease in total income in the economy that may result from the carbon tax is offset by the increase in income due to the higher capital formation. Assuming that the new investment is not harmful to the environment, or at least is less harmful, the added benefit is less harm done to the environment. Shackleton et al.⁶⁸ demonstrate that it would be beneficial if the introduction of carbon taxes was combined with a reduction in other types of taxes, especially taxes on new capital formation:

The cost of a carbon tax can be more than offset if the revenues are used to cut distortionary pre-existing taxes on new capital formation. In contrast, using the revenues to reduce the federal budget deficit or to finance cuts in taxes on labour tends to stimulate consumption but not investment; in these cases, therefore, the adverse economic impact of the carbon charge is offset only slightly.

Goulder⁶⁹ analyses several studies on these double dividend benefits, and finds there is not enough evidence to support this claim. He also points out that the studies that support the double dividend assume that an environmental tax is added to a tax system where inefficiencies already exist, and, therefore, it tries to correct these inefficiencies. It may,

in this case, be more cost-effective to address the inefficiencies directly. Kaplow⁷⁰ does not agree with this statement and is of the opinion that inefficiencies, like high carbon emissions and unequal distribution of income, should be addressed separately:

...for each problem, it tends to be desirable to employ that instrument which addresses it most directly. Use emissions taxes or permit schemes to get the carbon price right (which will induce efficient behavior on all margins related to the environmental challenge) and use the income tax and transfer scheme to produce the desired distribution.

Given these different views on the role of double dividend benefits, the welfare impact of a carbon tax cannot be analysed without a proper calculation of the environmental benefit. Advocates of such a tax would like to claim the double dividend benefits, as this implies that it is not necessary to calculate the environmental benefit – something that is very difficult. Devarajan et al. consider the introduction of different variants of carbon tax in South Africa. They find that:⁷¹

a direct carbon tax imposes the lowest distortion compared with taxes on energy or energy-intensive sectors. For a carbon tax that reduces emissions by 15 percent, the cost is roughly 0.3 percent of household welfare, whereas a tax on energy-intensive sectors imposes a cost that is close to 10 times that amount.

According to this study, the welfare cost of introducing a carbon tax, especially a direct tax on emissions, is very low. These authors are of the opinion that the costs are so low that it is not even necessary to consider them further, and that research concerning carbon tax should focus on other aspects, such as the implications for trade, which is addressed in section 10.7.⁷² However, any new tax that is introduced does not affect all participants in the economy equally, and especially not in a developing country context. According to Baranzini et al., the distributional impact of a carbon tax is complicated because it depends on at least four factors:⁷³

- Household expenditure patterns and differences in such patterns
- The incidence of the tax. Will consumers or producers and workers bear the burden in terms of lower profits and salaries?

- How will the environmental benefits (lower CO₂ emissions and limits on climate change) be distributed?
- How the tax revenue is used to influence the regressive impact of the carbon tax (i.e. has the largest negative welfare effect on the lower-income groups)

When considering the welfare effect of the different type variants of carbon tax in South Africa, Devarajan et al.⁷⁴ find that a direct tax on carbon emissions as well as a sales tax on energy-intensive sectors hurts the lowest-income earners the most, whereas a sales tax on energy inputs imposes no burden on lower-income groups. In a developing economy, like those in Africa, this is important because the introduction of any tax that is regressive will not be easy to introduce. For example, in a country with an unequal income distribution, the ruling political party will probably not be in favour of such a tax, as it will make them politically unpopular.

Creedy and Sleeman⁷⁵ study the possible effects of a carbon tax in New Zealand and find, like Devarajan et al., that the welfare cost of such a tax is very small. They also find the carbon tax had a very small redistribution effect. Smith,⁷⁶ however, points out that if one aspect of the tax system is regressive, it will not necessarily mean that the whole tax system will be regressive, and that it is the distributional effect of the whole tax system that needs to be considered, not just one aspect of it.

Boccanfuso et al.⁷⁷ summarise the results from several studies to determine the distributional impact of carbon taxes in developed and developing countries. In developed economies (OECD countries) the studies indicate that a carbon tax will have a regressive effect, and the degree of regressiveness will be influenced by the level of substitution between capital and labour. The studies also indicate that there are ways of decreasing the regressive impact, such as:

- using revenue from carbon tax to decrease income tax to achieve a more progressive tax system,
- job creation,
- using revenue from carbon tax to develop infrastructure to provide for the needs of the poorer segments of the community, and
- ensuring that the benefits of carbon change programmes are aimed at the poorer segments of the community.

Kerkhof et al. compare the distributional effect of a carbon tax with a tax on emission of all six GHGs covered under the Kyoto Protocol

(i.e. CO₂, CH₄, N₂O, HFCs, PFCs and SF₆) in the Netherlands.⁷⁸ They conclude that a tax on all six gases would be less regressive than a tax on only CO₂. The reason is that a CO₂ tax alone mainly affects energy-intensive products, whereas a tax on all six GHGs shifts a large part of the tax burden from energy-intensive products to food products. Although poorer households spend a larger portion of their income on food products than richer households, this difference is smaller than for energy-intensive products. This is an aspect to consider, and definitely needs to be analysed in the context of developing economies as well.

Few studies have been conducted on the distributional impact of carbon taxes in developing economies, but those that are available mostly confirm the regressive nature of the tax. Concerning this aspect, Boccanfuso et al., conclude that:⁷⁹

The limited number of applications with a more sophisticated method (CGE [computable general equilibrium] microsimulation approach) would lead us to conclude that too few studies have been performed on developing economies to draw clear recommendations, and more studies are needed.

Environmental policy in depressed economies may receive less attention. However, Pereira and Pereira⁸⁰ show that 'low growth and high public debt need not be regarded as hindrances for environmental fiscal reform but can actually be seen as catalysts'. They demonstrate that if revenues from carbon taxes are used to promote private or public investment and employment, this will stimulate economic growth, and if they are used to finance reductions in personal income taxation or firms' social security contributions, it will stimulate employment.

In summary, most studies indicate that carbon taxes would be regressive, but also that there are means to address this regressive nature. This can be done mainly by using the revenue collected from carbon taxes to decrease income tax of the poorer segments of the economy. What transpires from all these studies is that carbon taxes should form part of a well-designed and carefully considered total tax system.

Environmental Control Cost and Border Adjustments

If a country uses measures such as carbon tax, it may affect the competitiveness of those industries that are paying the carbon tax. This is

a reason why many countries, such as the US, have been wary to introduce carbon taxes or similar environmental protection policies. Border tax adjustments may be used to correct this. These adjustments refer to rebates on exports and taxes on imports to offset international differences in environmental control costs. A country that uses carbon tax may, for example, use an import levy on goods imported from countries where no such carbon tax exists, to protect the industries that have to pay the carbon tax. These are sometimes also called 'green tariffs'.

Demailly and Quirion⁸¹ demonstrate the importance of border tax adjustments. They analyse the effect of carbon tax on the cement industry in an Annex 1 country. Without border tax adjustments they estimate a 7,5 per cent decrease in cement production in a country using a carbon tax, and an increase in cement production in the rest of the world where no carbon tax exists. With the implementation of a border tax adjustment, cement production in the Annex 1 country only decreases by 2,0 per cent and global production decreases. This means that the use of carbon tax with border tax adjustment is much more effective in bringing down carbon emissions, specifically in the cement industry, but this should probably also apply to other industries.

Border tax adjustments would, in fact, be essential to ensure that environmental protection takes place without harming the trade position of the countries introducing it. Stiglitz states the following in this regard:⁸²

Not paying the cost of damage to the environment is a subsidy, just as not paying the full costs of workers would be. In most of the developed countries of the world today, firms are paying the cost of pollution to the global environment, in the form of taxes imposed on coal, oil, and gas. But American firms are being subsidized – and massively so. There is a simple remedy: other countries should prohibit the importation of American goods produced using energy intensive technologies, or, at the very least, impose a high tax on them, to offset the subsidy that those goods currently are receiving.

Aldy and Pizer⁸³ study the effect of a cap-and-trade system with a carbon price of \$15 per tone CO₂, but the results of their study would apply to a similar carbon tax. Their estimation is that if a country introduces environmental protection cost at this level, the impact on the affected industries would be very small and could be halved if similar policies are introduced by trading partners or if border adjustment policies are used.

However, implementation of border tax adjustments comes with its own set of problems. Ismer and Neuhoﬀ⁸⁴ summarise the possible problems with implementing border tax adjustments as follows:

- Legal problems: The World Trade Organization (WTO) prohibits its refunds for exports and taxes on imports that represent unfair discrimination against other countries that produce similar goods or services.
- Economic efficiency and transaction costs: Cost of implementation and use must be compared with the benefit that may be raised.
- Political considerations: The purpose of climate control measures is to try to convince different parties to work together, and this cooperation may be affected negatively by border tax adjustment because they are regarded as being discriminatory.

However, Ismer and Neuhoﬀ do not concern themselves with the political considerations, but show that border tax adjustments can be ‘feasible and compatible with WTO constraints’.⁸⁵ Border tax adjustments can also ensure optimal allocation of investment decisions and correct inefficiencies that may arise due to some countries not implementing climate-control measures.

A reason for using border tax adjustments would be that environmental-control measures, such as carbon taxes, could lead to investment shifting to countries that have not implemented such measures. The carbon emission would not be reduced through the carbon tax, but merely shifted. Goh⁸⁶ examines the implementation of such measures for this reason and finds that though it may be desirable economically, there can be many problems with the implementation, especially for members of the WTO. Each case should be considered individually. Biermann and Brohm⁸⁷ distinguish between the use of border tax adjustments to penalise developing countries and industrialised countries. They are of the opinion that:

border tax adjustments might be implemented – if justifiable under world trade law...against industrialized countries that gain trade advantages through persistently lower energy prices owing to insufficient implementation of climate policies. Border tax adjustments should be avoided, however, against developing countries, while other policies to address carbon leakage, such as financial and technological assistance, could be used instead.

Addressing the legality of introducing border tax adjustments is beyond the scope of this chapter, but a significant body of work is already available on this topic. Sheldon⁸⁸ briefly summarises the current position as follows:

According to WTO/UNEP (2009), a *border tax* (or tariff) is imposed on imported goods while a *border tax adjustment* is the imposition of a domestically imposed excise tax on *like* imported goods. Essentially GATT Article II: 2(a) allows members of the WTO to place on the imports of any good a border tax equivalent to an internal tax on the like good. However, under GATT Article III: 2, the BTA cannot be applied *in excess* of that applied directly or indirectly to the like domestic good, i.e., they have to be *neutral* in terms of their impact on trade, their objective being to preserve *competitive equality* between domestic and imported goods (WTO 1997). As a consequence, any country imposing a BTA in excess of the domestic tax would be in contravention of GATT Article III.

Sheldon⁸⁹ also explains that contradictions exist in the wording of some of the General Agreement on Tariffs and Trade (GATT) articles, which makes it difficult to interpret whether border taxes on energy inputs may be allowable under WTO rules. According to GATT Article II.2(a), such taxes may only be applied to inputs that are physically contained in the final product, thus not energy inputs; however, according to GATT Article III.2, border tax adjustments may be applied to inputs, which would then allow for taxes on energy inputs as well.⁹⁰

The purpose of international trade laws is to ensure that trade takes place on a fair basis and that unfair trade discrimination does not exist – their purpose is not to protect the environment. However, the use of carbon tax or similar environmental protection measures that involve cost to the producers will affect trade, and if they are to be made effective it is important that they should be combined with trade regulation. Coordination between organisations responsible for protecting the environment and organisations responsible for regulating trade is important. As Charnovitz puts it:⁹¹ ‘The trade regime should be thinking about how it can help to head off global warming, and the climate regime should be thinking about how environmental policy can benefit from trade liberalization.’

Conclusion

This chapter described the theoretical background base for using carbon taxes to contain GHGs. In institutional and interventionist policy measures, carbon tax is one of three broad categories of intervention, namely decentralised methods, command-and-control methods, and market-based measures, such as taxes, subsidies and tradeable permits. Referring to Africa, a lack of institutional capacity limits the implementation of the first policy measure. In general, this lack of institutional capacity is also a limiting factor on the implementation of the other policy measures. However, it seems that market-based policies are the preferred policy measure.

The experience with carbon tax as a policy measure is eclectic. Carbon taxes will not play a role in countries, such as some developing countries, that do not take responsibility for climate change. This is based on the piecemeal information that is available. In developed countries carbon taxes play a role in centralised and decentralised environmental policy measures. The role of carbon taxes, however, in such measures is declining or is used as a complement to other environmental taxes.

The advantages and disadvantages of carbon tax and carbon credits were compared. From this brief summary it is clear that several aspects need to be considered in choosing the correct type of emission abatement policy, or the mix of policy that will be most effective in a particular region or economy. If carbon tax or carbon credits are not implemented consistently by all countries, it may affect trade of the country where it is being introduced, and this may lead to border tax adjustments to correct the price implications. Border tax adjustments were briefly discussed and it was pointed out that over and above the economic costs and benefits that need to be analysed before introducing such adjustment measures, there are legal aspects to consider, as well as political considerations.

The debate on global warming and the desire to put in place measures to ensure ethical behaviour as far as the environment is concerned have led to renewed interest in environmental tax in general, and carbon tax in particular. The European Union's Emission Trading Scheme focused most on tradeable carbon credits. Recently, however, there has been renewed interest in the use of carbon taxes to address the issue of carbon emissions. We have shown in this chapter why the last word on this debate has not been spoken yet.

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Looking ahead

Africa's future in a green global economy

Godwell Nhamo and Muchaiteyi Togo

Introduction

There is no doubt that African governments need to pay particular attention to the demands of the current and future green global economy. Such an economy is mainly driven by the desire to reduce greenhouse gas (GHG) emissions and mitigate the negative impacts of climate change. Although Africa currently contributes less than 4 per cent of total global GHG emissions, its future growth trajectories reflect a path that will demand more energy, particularly from dirty sources that power energy-intensive industries in mining and manufacturing. The continent is also thirsty for resources, which, when exploited, will significantly contribute to higher GHG emissions in a few decades to come. From the continent's perspective, South Africa is among the top 15 GHG emitters in the world. Other potential growth hubs with a potential for significant GHG emissions include Nigeria, the Democratic Republic of Congo (DRC), Angola, Kenya, Ghana and Egypt. Africa's growth potential also draws heavily from agriculture, a sector that contributes significantly to GHG emissions.

If not checked, continued GHG emissions in Africa and other developing regions will result in further degradation of the environment through global warming, which leads to climate change. To this end, this book makes a call for responsible African governments – governments that will address poverty and inequality while taking responsibility in

the areas of climate mitigation within their common but differentiated responsibilities and capabilities. Such a move is necessary in order to divert unnecessary future potential trade wars linked to the need to protect the environment.

The rest of this chapter is divided into three parts. The first part summarises the contents of the book; the second presents a synopsis of the practical ways in which Africa can take part in the green economy and climate mitigation without curtailing its developmental agenda; and the third and last section outlines pointers for further research.

Key Topics Addressed in This Book

The book addressed a number of topics that were deemed to be of great relevance to Africa. Clarity was sought on the concept of the green economy and how this relates to sustainable development. The book argued that the green economy presents an opportunity and a channel for implementing sustainable development. Sustainable development, although acknowledged to represent a shift from purely economic-based development models, is nevertheless criticised for being a contentious and contested concept which can be manipulated to be anthropocentric in focus. This is despite the fact that there are arguments that emphasise the interpretation of sustainable development within a holistic approach that emphasises the interrelationships and inextricable linkages among social, economic and ecological dimensions. The authors support the view that the green economy should not be viewed as a substitute for sustainable development. Instead, the green economy was presented as one facet, among others, through which sustainable development can be implemented. The green economy, the book concluded, centres on the transition to a low-carbon economy, in which the desire to address the negative impacts of climate change is key. The book acknowledged that the green economy presents both risks and opportunities for Africa, and the continent must take advantage of the opportunities presented.

Central to the green economy and climate change mitigation is environmental financing. Following the 2008 global economic crisis, green global stimulus packages emerged as part of the economic stimulus packages that were meant to revive the global economy. The stimulus packages gave birth to and are recognised for strengthening the concept of the green economy. Key industrial sectors targeted by the packages were identified to be the energy sector (especially renewable energy), transport and smart grids. There is still no formula for implementing

green stimulus packages and in countries that have so far been involved, these have taken various forms. However, some of the stimulus components may not be sustained in the long run (e.g. subsidies); neither can development be based on green initiatives alone. In Africa, there has not been much involvement in environmental financing, but the continent is well placed to draw lessons (especially in terms of opportunities and challenges) from the experience of other nations worldwide.

For Africa to benefit more from the green economy, the subject of carbon accounting and benchmarking becomes more relevant. This is a new discipline that traditional accountants in Africa are not familiar with. Carbon benchmarking is the first step taken by entities, including governments, that wish to address the negative impacts associated with their footprints. To facilitate this, both global and national regulatory frameworks have been developed to assist in carbon accounting. In Africa, South Africa is already involved in carbon accounting through the Carbon Disclosure Project. Carbon accounting is also relevant for carbon offsetting through various vehicles enshrined within either the compliance or voluntary carbon markets. African experts will need to get involved in the measuring, reporting and verification of GHG emissions.

The book also addressed issues related to carbon assets within an uncertain and contested climate negotiation regime. Carbon assets have emerged as a new method of mitigating climate change. The most common carbon assets are those established under the Kyoto Protocol mechanism: the Clean Development Mechanism (CDM), joint implementation and emissions trading. These three mechanisms constitute the bulk of the compliance carbon market mechanism. The CDM has been the mechanism in which African countries participate in GHG emissions reduction. However, the book revealed that the Kyoto Protocol was under threat of extinction in 2012 following disagreements within the international climate negotiations over the second commitment period. By the time of completing this book, two rounds of climate negotiation talks had taken place. The second round of negotiations, which took place in Bonn, Germany, in June 2011, leading to COP17 in Durban, revealed the major fractures between the bloc of the developed countries of the north and the developing countries of the south. The US maintained its stance that it would not ratify the Kyoto Protocol unless large emitters from developing countries – among them Brazil, China, India, Mexico and South Africa – do more. To add salt to the wounds, Russia, Japan and Canada indicated that they would not be part of the second Kyoto

Protocol commitment period. Despite the challenge of a potential rupture of the climate negotiations in Durban, the issue of climate financing has grown big on the global climate negotiation agenda. The governance structure of the Green Climate Fund, proposed in Copenhagen in 2009 and incorporated into the global climate regulatory regime through the 2010 Cancún agreements, is still a contested issue.

Related to carbon assets is the topic of carbon pricing. For Africa to be on the ball with carbon trade as one of the climate mitigation agendas, the continent should be abreast with pricing mechanisms. The book deliberated on carbon pricing models and drew insights from these to explore the nature of the global carbon market and the chances of its survival and continuation. The pricing of carbon assets was established to resemble that of other financial assets, such as bonds and shares. The cap-and-trade system of the European Union was found to be a popular method in carbon asset pricing. Volatility in this market following the first and second phases presented valuable insights for Africa. A number of factors that determine the behaviour of carbon markets were identified, chief among them the over-issuance of allowances or permits. African countries are still deliberating on suitable ways of diminishing emissions, and the World Bank established a fund to assist willing governments. However, the uncertain future of global climate policy post-Kyoto Protocol in 2012 has also resulted in uncertainties in the cap-and-trade system and its possible adoption on the continent.

Multilateral development banks (MDBs) have played a pivotal role in African growth and development. To this end, the role of MDBs in climate and carbon asset financing was investigated in the book. It emerged that MDBs were in a privileged position because they are more efficient in disbursing than other systems, like the bilateral or UN-backed ones. The Global Environment Facility is one such UN system of climate and carbon financing that was discussed. The World Bank was found to be the largest MDB involved in carbon asset financing, both at a global level and in Africa. Involvement of MDBs is expected to increase. Opportunities were identified for Africa, as well as the manner in which governments supported by MDBs could tap into climate and carbon asset finance. The African Development Bank was also identified as having strong links to a number of climate and carbon asset finance initiatives, both from its own sources and from the World Bank. During the Cancún climate negotiations in 2010, the African Development Bank indicated that it wished to take greater part in administering the newly established Green Climate Fund.

The need to finance projects known as reducing emissions from deforestation and forest degradation/plus (REDD/REDD+) in Africa emerged as another topical issue for the book. With most countries in the north having degraded their biodiversity, the rush is on to protect African forests and their biodiversity in order to save the world. The World Bank, UNREDD and other funding which African governments could take advantage of were defined. It emerged, however, that African governments must put in place mechanisms to manage the flow of REDD(+) funds, as patterns were emerging whereby certain equatorial countries, among them the DRC, were receiving more than their fair share of REDD(+) finance. The REDD(+) mechanism was also determined to be an area where African capacity needs to be developed urgently, especially in terms of the measuring, reporting and verification of carbon sinks. Issues pertaining to carbon rights also surfaced. The main concern is the potential sidelining of local and indigenous communities in terms of the benefits and rights of REDD(+) initiatives. The book also put across that Africa is still regarded as a high-risk investment environment due to weak capacity, poor governance and issues relating to land tenure and law enforcement. Despite the challenges, REDD(+) was presented as a vehicle that places Africa at the centre of GHG emission reductions.

The relationship between climate change and trade is proving to be a fast-growing aspect of the green economy. To address this element, a case study focusing on South African trade was presented. This case study provides insights that could be drawn upon as Africa addresses the need to be climate-compliant in order to generate more international trade. The case study focuses on climate change regulatory regimes in China, the UK and the US, and their impact on South Africa's export sector and business. The book also presented measures that South Africa and other countries could put in place to move closer to climate-compliant regimes. South Africa was acknowledged to have done well in moving towards a climate-compliant economy, as a number of trade-related policies and regulations have already been put in place. Among the policies and regulations are the Energy Efficiency Strategy, Long-Term Mitigation Scenarios, renewable energy feed-in tariffs and Industrial Policy Action Plan. At the time of completing the book two key policies were under public comment and review: the National Climate Change Response Strategy and the Carbon Tax Option. South Africa's progress is a good example in terms of fulfilling the requirements of the Cancún agreements on having nationally appropriate mitigation actions.

Carbon taxation under climate change has proved to be a hot topic globally and in Africa. It is a form of carbon pricing employed as a levy on the carbon content of fuels to reduce GHG emissions. Carbon taxation seems to be viewed by many governments as an easy route to implement measures aimed at mitigating climate change. While the carbon tax is a good intervention measure, the book discusses this alongside other potential interventions like the cap and trade. What emerges from the book is that the implementation of a carbon tax as an intervention measure was constrained by lack of institutional capacity in Africa. Information relating to the extent of environmental damage through climate change that carbon taxes are intended to curtail is not readily available. The book advocates that African governments should not put in place carbon taxation for the purposes of widening their tax base, but for good environmental stewardship. This point highlights the need for accountability in terms of how such carbon tax revenue is utilised.

An African Road Map for a Green Economy

There are certainly many benefits associated with the acceptance and implementation of a green economy agenda in Africa. Examples of these benefits include the transition to a low-carbon economy, resulting in lower GHG emissions; reduced global warming and fewer impacts associated with climate change; employment creation; clean technologies; a responsible consumer population; good global citizenship; and increased trade. To reap these benefits in the future, African governments should work on a new generation of policies, including mainstreaming the green economy and climate change into existing legislation. Discussed below are a number of areas that require urgent attention.

- **Common understanding of the green economy:** There is now a consensus in terms of understanding climate change and mitigation. However, there is still a huge gap in terms of understanding the concept of the green economy. To this end, Africa should move towards a common understanding of what this new phenomenon is and how it can benefit Africa, especially in terms of driving the agenda to reduce poverty and inequality.
- **Engagement with REDD(+):** There is no doubt that REDD(+) presents a direct potential for new investment portfolios in Africa. However, the lack of comprehensive pan-African, sub-regional and

national policy frameworks for REDD(+) makes it difficult to implement on the continent. While many African governments are still orienting themselves to REDD(+), deals are being made outside the continent, some of which cannot be reversed. When it comes to REDD(+) the emphasis should not be on rhetorical benefits, such as those that were promised under the Kyoto Protocol's CDM, but on tangible benefits to local and indigenous communities. The carbon sinks rights and how they are shared with local and indigenous communities should be well documented in national and/or regional and state laws. Currently, a significant amount of funding is available for REDD(+) readiness initiatives. REDD(+) readiness looks mainly at capacity development and other up-front costs. African governments are critically short of experts in the REDD(+) field and where they do exist, they might not be placed in their right positions. Hence, building REDD(+) capacity, particularly in the areas of policy as well as measuring, reporting and verification, is a matter of urgency. The UNEP concurs with the need for capacity development, training and education to enhance the readiness of economies in the transition to a green economy in general.

- **Understanding Africa's diversity:** Given that Africa has countries that come with different challenges in terms of size, levels of democracy, extent of environmental decay, levels of GHG emissions, vulnerability to climate change, poverty, levels of education, availability of natural and other resources, etc., a 'one-size-fits-all' approach may not work. Similarly, transition to a green economy might take slightly longer for other countries.
- **Linking into the adaptation agenda:** The manner in which the green economy will be harnessed by Africa is directly linked to Africa's climate change adaptation agenda. This is an agenda that focuses more on how Africa learns to live with the changing climate. To this end, one finds that a lot more resources in the field of climate change will be channelled towards adaptation. Hence, it might be seen as if many African countries do not favour the climate mitigation agenda.
- **Need for sound legislation and swift engagements:** The need for a sound policy and regulatory environment both in Africa and at the international level is necessary in implementing the green

economy. The anticipated cessation of the Kyoto Protocol has already created uncertainties in carbon pricing. Traditionally, Africa lags behind in terms of domesticating international treaties. The developments taking place swiftly in the green economy, such as research and development, diffusion and deployment, and transfer of environmentally sound technologies, demand that countries move swiftly.

- **Understanding the green economy and agriculture:** African economies are dependent on agriculture, with most rural communities practising subsistence agriculture. Linking the green economy to communities dependent on agriculture becomes critical. Although new opportunities will emerge in the transition to green economies, some industries and jobs are bound to disappear. This could be so if climate-change-related trade wars escalate. African governments, therefore, need to be prepared for such eventualities and serve their people accordingly.
- **Role of MDBs and the Green Climate Fund:** The crucial role played by MDBs in Africa's development cannot be overemphasised. However, with experiences of the World Bank and International Monetary Fund-led model of growth and development of the 1980s, Africa has had a fair share of the negatives associated with the economic structural adjustment programmes. As has been acknowledged by the World Bank and IMF, weaknesses existed and blunders have been made in the past funding models. Overall, the book raised the challenges associated with MDBs loans and concessions. Lengthy approval periods and lengthy disbursement periods are common features of the MDBs' governance mechanisms. Hence, African governments should advocate for new ways that facilitate speedy approval and disbursements of the proposed Green Climate Funds. Africa and other developing countries have already protested against the involvement of the World Bank as a trustee for the Green Climate Fund, as stipulated in the Cancún agreements.
- **Towards climate-compliant trade regimes:** The next wars of this century are likely to be fought over green trade. Given that global treaties are by their nature weak, whatever treaty will come out of Durban 2011 or afterwards will be weak. This leaves a gap in terms of the international climate change regulatory regimes. It

is, therefore, a foreseeable possibility that powerful countries of the north will implement unilateral restrictions on carbon-intensive goods in order to level the playing field. Given this scenario, African countries that have significant GHG emissions must embark on climate mitigation.

- The need to look after national interests: In addition to the need to be good stewards over common global resources like the atmosphere, through the green economy, African governments have an obligation to look after their citizens. To this end, the global agenda to address climate change must be informed fully by the national and local agenda to eradicate poverty, hunger and inequality.

Areas for Further Work

The authors of this book acknowledge that the topics selected in this volume are not exhaustive – both in terms of content and spread. To this end, a number of other areas can be identified for further research. Among the areas not covered in this book are: energy security; energy farming, climate mitigation and food security; and population growth. Research pointers for these topics are considered in the next paragraphs.

- Energy security and climate mitigation: Energy security has been a major issue in Africa. This is an aspect that might not be clearly understood until one has witnessed a night-time global satellite map. From such a map, one can clearly see how very well-lit the northern hemisphere is compared to the southern hemisphere. From the southern hemisphere, one will be struck by the deep darkness of the African continent, the pattern of which is broken by a well-lit South Africa. This image presents both the risks and opportunities associated with energy security in Africa. With regard to opportunities, Africa is in a privileged position to address its future energy needs through cleaner technologies associated with renewable energy: wind, solar, natural gas, geothermal, tidal and wave, biomass, etc. In addition, environmentally sound technologies for energy efficiency as well as demand side management can also be used. The Southern African Power Pool has been on the cards for years. Hence, more urgency is required to bring this project to full capacity and operation. Africa also has a huge potential in terms of traditional and ‘dirty’ energy sources, including

coal and crude oil. Since the turn of the 21st century, more coal and more crude oil have been discovered. The use of synthetic fuels is also significant, especially in South Africa, where Sasol has a monopoly. 'Dirty' energy sources certainly present a challenge for Africa. The associated risk is that most of Africa's produce will have an inherently high carbon footprint, an aspect that will attract border carbon adjustment taxes. Furthermore, if governments are not careful, they will import the dirty and obsolete technologies from the developed countries that will be dumped on the continent to exploit coal and crude oil reserves. In order to act responsibly, Africa needs to invest heavily in research and development that addresses the future transition to clean coal and clean petroleum resources. This is a venture that cannot be done by African governments alone, but through partnerships. The world is already moving away from the combustion engine and in the next decade, millions of electric and natural-gas-powered vehicles will grace the streets of Africa.

- **Energy farming, climate mitigation and food security:** Debates have been raging in terms of the cost benefits associated with energy farming. Although biofuels may be a blessing for mitigating GHG emissions, there is a risk in that African farmers might end up growing grains for the energy mills. In addition, contract farming on African soil has the potential to instigate land grabs in order to feed energy mills outside the continent. More work is required in order to determine how and the extent to which African governments could become involved in sustainable energy farming. Food security is a high priority for the continent as Africa struggles to meet its Millennium Development Goals.
- **Population growth and climate change:** There is a direct correlation between GHG emissions and the number of people at any given time. Therefore, a growing African population means a growth in GHG emissions. However, demography lessons from the developed countries reveal that population growth control measures must permit a constant supply in all the age groups. Although we worry about unsustainable population growth in Africa, we also need to manage the growth in a manner that will not thwart the labour requirements of growing industries.

Green Economy and Climate Mitigation: Topics of Relevance to Africa

The book comes at a time when key role players are battling to find solutions to a challenge of our time - climate change. To address some of the concerns, the authors identified topics of relevance to Africa, among them: discourses surrounding the green economy and sustainable development; financing green economies; carbon benchmarking; role of multilateral development banks in carbon financing; and carbon taxation. The book mainstreams climate change into 'unfamiliar' territories, such as accounting, finance, management, education, economics and banking. I would recommend this book to readers destined to become influential in addressing climate change.

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Climate change is real and is impacting on economies and lives in Africa, especially rural livelihoods. The effects of the climate change phenomena have drawn bitter debate between both the developed and developing countries. This book distils the issues and the priorities; the authors have flagged some of the most complex issues on and off the table. It is an intellectual contribution that helps move the debate forward and discusses the options available for some of the African countries. This is a contribution just at the right time, when the issues are still very pertinent, controversial and still unclear to many policy makers in Africa.

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ISBN 978-0-7963-0293-7



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